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PhD date: 2023

Dear REStat Editors,

I am writing to apply for the 2025 REStat Fellowship for the NBER Summer Institute. I am an applied microeconomist and Assistant Professor of Economics at Texas Christian University. My research in health economics primarily focuses on issues of sexual and reproductive health. Below, I summarize my current research activities and describe the unique perspective that I would bring to the Summer Institute. Attached to this letter you will find my current CV and a recent research paper, "The Effects of Restricted Abortion Access on IUDs and Vasectomies: Evidence from Texas."

Currently, my research agenda focuses exclusively on measuring the broad-spectrum effects of restricted access to abortion in the United States. After the 2022 *Dobbs v. Jackson* decision from the US Supreme Court, these issues took center stage of the national public policy discourse, and they remain relevant as the country wrestles with a new normal in which a person's reproductive autonomy is entirely in the hands of the state legislature.

I am working on two projects related to how the abortion policy environment shapes political behavior. In one collaborate project with Melissa Spencer and Kayleigh McCrary (University of Richmond), we explore the effects of the post-*Dobbs* abortion bans and abortion ballot measures on voter turnout and partisan vote shares. In a separate related project including Melissa and Kayleigh as well as Erdal Tekin (American University) and Erkmen Aslim (University of Vermont), we measure the effects of increasing travel distance to an abortion provider and proximity to abortion clinic closures on voting participation and outcomes. I maintain an interest in exploring the ways that abortion access influences healthcare decision and delivery. I am working with Cara Haughey (Michigan State University) to extend our work studying IUDs in Texas following a major abortion restriction to also consider the effects of abortion access on female sterilization procedures. Lastly, I have a project with Sam Mann (RAND) measuring the degree of physician mobility after the *Dobbs* decision, work that measures the extent of potential physician shortages in restrictive abortion environments.

I believe that several aspects of my experience would contribute a unique perspective to the Summer Institute. As a first generation student, my relationship with the academic community and research process is shaped by my quest to discover the hidden curriculum of the academy. I find often that what others may see as obvious and given does not reflect my experiences, and this creates an opportunity for productive conversation in many contexts. In addition, I work in an institution that is not traditionally represented at the Summer Institute. To the best of my knowledge, none of my colleagues have attended the Institute any time recently, and this could in part be due to a limitation of resources. The economics department at TCU is

housed in the college of liberal arts, and we employ the traditional liberal arts model of education. As a result, funds and resources for research are often more limited than at research institutions.

Attendance at the Summer Institute via this fellowship would mean an opportunity to expand my professional research network, first and foremost. I have come to understand the myriad of ways that these networks are important to the development of cutting-edge research in economics as well as to individual career progression. This fellowship would provide a chance to interact with the top economics scholars today – a chance that the limited resources at my institution would not normally provide. I am particularly interested in attending the **economics of health** or **gender in the economy** meetings. Thank you for your consideration, and please find the rest of my materials attached below.

Best regards,



Graham Gardner, PhD
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Graham Gardner

Curriculum Vitae, February 2025

Contact Information

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Education

Ph.D.	Economics, Michigan State University	2018 – 2023
M.A.	Economics, Michigan State University	2018 – 2020
B.S.	Mathematics, Union University, *summa cum laude*	2014 – 2017

Employment

Assistant Professor, Department of Economics, Texas Christian University	2023 - Present

Fields of Interest

Health Economics, Public Economics

Publications

Gardner, G., McCrary, K., Spencer, M. 2025. "Abortion Ballot Measures Affect Election Outcomes" *Economics Letters*

Gardner, G. 2024. "The Maternal and Infant Health Consequences of Restricted Access to Abortion in the United States." *Journal of Health Economics*

Gardner, G. 2024. "Notification and Consent: The Differential Effects of Parental Involvement Laws on Teen Abortion." *Review of Economics of the Household*

Sneed, R.S., Stubblefield, A., Gardner, G., Jordan, T., Mezuk, B. 2023. "Chronic Disease and Workforce Participation Among Medicaid Enrollees Over 50: The Potential Impact of Medicaid Work Requirements Post-COVID-19." *Journal of Aging and Social Policy*

Working Papers

"The Effect of Restricted Abortion Access on IUDs and Vasectomies: Evidence from Texas" (with Bradley Crowe and Cara Haughey). *Revise & Resubmit at Journal of Health Economics*

Works in Progress

"The Spillover Effects of Parental Involvements Laws on Older Teens"

"Physician Mobility Post-Dobbs" with Samuel Mann

"Abortion Access and Female Sterilization" with Cara Haughey

"Abortion Ballot Measures and Voting Behavior" with Kayleigh McCrary and Melissa Spencer

Teaching Experience

ECON 30243 Contending Perspectives in Economics	Spring 2024 - Present
ECON 10223 Introduction to Microeconomics	Fall 2023 – Spring 2024
ECON 40970 Global Health Economics and Policy	Spring 2025

Fellowships and Awards

TCU Junior Faculty Summer Research Program Grant ($6,000)	2024
Diversity Fellow, American Society of Health Economists	2023
Excellence in Teaching Award, MSU Department of Economics	2021
MSU Interdisciplinary Inquiry and Teaching Fellowship ($5,000)	2021-2022
Red Cedar Award, MSU Graduate School ($1,500)	2021

Professional Memberships and Conference Presentations

Memberships: American Economic Association, American Society of Health Economists, Association for Public Policy Analysis and Management, Society of Family Planning

Presentations: Association for Public Policy Analysis and Management Annual Conference 2021, 2024, American Society of Health Economists Annual Conference 2022, 2024, Midwest Health Economics Conference 2022, Southern Economic Association Conference 2022, 2023.

Service

Referee Service

Journal of Health Economics, Review of Economics of the Household, Journal of Economics, Race, and Policy, American Journal of Preventative Medicine

Professional Service

Session Organizer - Southern Economic Association Conference Fall 2022, American Society of Health Economists Annual Conference 2024.

Mentor, Committee on the Status of LGBTQ+ Individuals in the Economics Profession Annual Mentorship Conference Summer 2023, Summer 2024

Abstract Reviewer, Society of Family Planning Annual Meeting Fall 2024

University Service

TCU:

Search Committee, Department of Economics	Fall 2024 – Spring 2025

Michigan State:

Department of Economics Committee on Diversity, Equity, and Inclusion	Spring 2022 – Spring 2023
Department of Economics Graduate Student Organization	Fall 2020 – Spring 2021
Department of Economics First Year Mentor	Fall 2019 – Spring 2022

The Effects of Restricted Abortion Access on IUDs and Vasectomies: Evidence from Texas

Bradley Crowe[‡] Graham Gardner[†] Cara Haughey[‡]

Abstract

Contraception and abortion both result in fertility reductions but identifying if they are substitutes remains an open question. Using administrative outpatient records from Texas, we exploit the passage of House Bill 2 (HB2), which imposed strict regulations on abortion providers, to identify the effects of restricted abortion access on the timing and demand for intrauterine devices (IUDs) and vasectomies using an event study design. We find evidence that expectations of limited abortion access significantly increase the demand for IUDs, with no substantial evidence of an effect for the incidence of vasectomies. These findings support the hypothesis that abortion and contraception are substitutes, particularly for individuals with the capacity to become pregnant.

Keywords: abortion, family planning, TRAP laws, contraception, long-acting contraception, IUD, vasectomy
JEL Codes: I10, I18, J13, J16

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1. Introduction

In 2022, the United States Supreme Court transferred the power to regulate abortion access to individual states in the landmark case *Dobbs v. Jackson Women's Health Organization*. This decision ultimately ruled that the U.S. Constitution does not guarantee the right to abortion, overturning *Roe v. Wade* (1973) and *Planned Parenthood v. Casey* (1992). Prior to the ruling, thirteen states enacted “trigger" laws to ban or limit abortion immediately after the repeal of *Roe*. Many states created laws to restrict abortion access or prohibit abortion entirely in the months that followed the *Dobbs* decision. In the one hundred days following *Dobbs*, 66 abortion clinics closed across 15 states (Kirstein et al., 2022), creating substantial barriers to abortion access in the United States.

Limited access to abortion could affect fertility and sexual behavior through multiple channels. For example, reduced access to abortion may lead to increases in births, particularly for those who would have chosen abortion if the option were available. Alternatively, restricted abortion access may lead to fewer births through either decreases in sexual activity or increases in contraceptive use. Prior research finds that restricted abortion access affects birth rates (Jones & Pineda-Torres, 2024; Venator & Fletcher, 2021; Myers & Ladd, 2020; Guldi, 2008; Kane & Staiger, 1996) and sexual behavior (Colman et al., 2013; Klick et al., 2012). However, research on how changes in abortion access affects contraceptive use is limited.

If abortion and contraceptives are substitutes, economic theory predicts that increasing the cost of abortion by restricting abortion access would result in an increase in demand for contraceptives. Much of the literature shows that changes in abortion access increase fertility and birth rates. However, if substitution behavior between contraceptives and abortion is not

accounted for, these studies may be underestimating the effects of abortion on fertility. In addition, understanding the substitutability between abortion and contraception, particularly post-*Dobbs*, can provide policymakers with strategies to support individuals as the cost of abortion increases. Given the evidence that limiting abortion access increases maternal mortality (Kheyfets et al., 2023), providing affordable access to contraception may mitigate the effects of restricted abortion access on maternal health outcomes.

In this paper, we begin to disentangle the relationship between restricting access to abortion and demand for long-acting contraceptives. In 2013, Texas implemented House Bill 2 (HB2), a regulation on abortion providers that shuttered over half of all abortion clinics in the state. This resulted in a significant change in the distance to an abortion provider for many Texas residents. We pair this variation in the distance to the nearest abortion facility with administrative outpatient records from hospitals, hospital-owned facilities, and ambulatory surgical centers (ASCs) to compare trends in the incidence of intrauterine devices (IUDs) and vasectomies.

We find that overall hospital-based intrauterine device (IUD)[1] insertions rose in Texas between 2011 and 2015, and trends peak around the introduction and passage of HB2. In counties that experience a greater-than-30-mile increase in their distance to an abortion provider, IUD incidence increases at a significantly higher rate around the time of the policy change.

This paper contributes to the literature on the effects of restrictive abortion policies by identifying a link between abortion restrictions and increased contraceptive use. Other research on abortion restriction finds detrimental socioeconomic and health outcomes resulting from decreased access to abortion, in addition to the aforementioned effects on fertility and sexual

[1] Long-acting reversible contraceptives (LARC) include hormonal and non-hormonal IUDs and subdermal contraceptive implants. We observe very few subdermal implants in our sample, and therefore do not look at the effect of HB2 on subdermal implants in this paper.

behavior. Previous studies find poor pregnancy-related health outcomes, decreases in college-going behavior, and decreases in future family income (Farin et al., 2021; S. Miller et al., 2023).

We also add to the literature on contraceptive use and family planning. Much of the previous literature uses increased access to contraceptives to examine how contraceptives decreased family size and improved educational and labor market outcomes for women by giving them more control over the timing and frequency of births (Bailey, 2005, 2010, 2013; Goldin & Katz, 2002). Further, researchers find that access to contraceptives lead to a decrease in the share of children born to economically disadvantaged households and a decrease in the number of children with low birthweight (Ananat & Hungerman, 2012). However, much of this literature focuses specifically on one type of contraceptive: the oral contraceptive pill. Our analysis adds to this work by studying the use of long-acting reversible contraceptives (LARC) and vasectomy, both of which provide more effective protection against pregnancy. Lindo & Packham (2017) also examine LARC take-up, but their research uses expanded access to LARC rather than contracted access to abortion as their main source of variation.

Three papers measure the effect of abortion access on contraceptive choices. G. Miller & Valente (2016) use health surveys to understand how the rapid expansion of legal abortion access in Nepal changed contraceptive utilization. The authors find evidence that an additional abortion clinic in an individual's district decreases the odds of contraceptive use by 2.6 percent. In the United States context, however, the evidence of the relationship between contraception and abortion is less clear. Felkey & Lybecker (2017) find that state-level abortion restrictions do not affect the reported contraceptive method of choice among reproductive-age women. On the other hand, Ellison et al. (2024) find descriptive evidence of an increase in permanent contraceptive choices, such as tubal ligation and vasectomy, after the *Dobbs* decision. Our paper expands this

work using administrative data and causal inference techniques to contribute to the understanding of the demand for IUDs and vasectomy resulting from restricted access to abortion services.

Finally, our research adds to the literature evaluating the effects of HB2 and similar legislation in Texas. Prior research shows that changes in the distance to the nearest abortion provider due to HB2 reduced abortion rates and increased birth rates within the state (Lindo et al., 2020). Additionally, two studies examine the relationship between Texas legislation and contraceptive use. The first finds a correlation between Texas legislation that excluded Planned Parenthood from Medicaid reimbursement and decreases in LARC and injectable contraceptive utilization among Medicaid recipients (Stevenson et al., 2020). Additionally, Fischer et al. (2018) finds no change in emergency contraceptive purchases or condom sales due to HB2.

The remainder of this paper proceeds as follows. Section 2 explains the relevant history and background, including a description of IUDs and vasectomies and the policy environment that generates our source of variation. Section 3 describes the data and Section 4 presents our methods and results. Section 5 concludes.

2. History and Background

2.1. Long-Acting Reversible Contraception and Vasectomy

Contraceptive users choose from several different contraceptive options, all with different efficacy rates, financial costs, and side effects.[2] IUDs are flexible, T-shaped devices placed in the uterus by a physician. The device prevents fertilization by decreasing sperm motility using either

[2] Other types of contraceptive methods include the contraceptive pill, shot, patch, and vaginal ring, condoms, diaphragm, sponge, spermicide, fertility awareness, withdrawal, and abstinence. For complete details on contraceptive methods, see https://www.plannedparenthood.org/learn/birth-control (Planned Parenthood, 2024).

hormonal or non-hormonal properties, depending on the type of IUD. The non-hormonal IUDs, such as Paragard, are wrapped in copper and can protect from pregnancy up to 12 years. Hormonal IUDs, including Mirena and Kyleena, can protect from pregnancy between 3 and 8 years, depending on the product.

Although IUDs were introduced shortly after the oral contraceptive pill, they received significant negative press following a series of studies in 1974 that linked IUDs to pelvic inflammatory disease (Sonfield, 2015). Modern IUDs were introduced in 1988 (Paragard) and 2001 (Mirena). Table 1 lists the varying types of contraceptives and their use frequency among users between 15 and 49. While IUDs are among the most popular contraceptives, with 12.9 percent of contraceptive users choosing IUDs, use remains lower than oral contraceptives, with 21.4 percent of contraceptive users choosing oral contraceptives. Initially, IUDs were only approved by the Food and Drug Administration (FDA) for use by parous people, however the FDA approved IUDs for nulliparous people in 2005. In spite of the updated FDA guidelines, misconceptions about the safety of IUDs for nulliparous people remained prevalent for years after the updates (Tyler et al., 2012).

The ease of use and effectiveness of IUDs may make them particularly attractive to individuals facing increased barriers to abortion access. IUDs are over 99 percent effective at preventing pregnancy with typical use. In contrast, condoms are 87 percent effective, and the oral contraceptive pill is 93 percent effective at preventing pregnancy with typical use. Further, while oral contraceptives and condoms are subject to user error, IUDs are inserted and removed in a physician's office and therefore require very little effort on the part of the user. However, IUD insertion and removal can be painful, and users may experience unpleasant side effects including irregular menstrual bleeding, spotting, and mood changes (Lindo & Packham, 2017)

Table 1: Contraceptive method choice
Most effective method used in the past month by U.S. women, 2018

Method	% of contraceptive users, 15-49
Permanent Female	27.7
Pill	21.4
Male condom	12.9
IUD	12.9
Partner Vasectomy	8.6
Withdrawal	5.6
Implant	3.1
Injectable	3
Natural family planning	2.6
Vaginal ring	1.3
Patch	0.5
Emergency contraception	0.2
Other method	0.3
No method	n/a
Observations	47,444,047

Source: Contraceptive Use in the United States by Method; Guttmacher Institute, 2021

Vasectomy is an outpatient, surgical procedure that can be completed under local anesthesia. This method of contraception is done by puncturing or severing the vas deferens, which is the tube that carries sperm. It is an extremely effective form of contraception, though pregnancy can occur shortly after the procedure before sperm are cleared from the reproductive tract (Schwingl & Guess, 2000). Vasectomy is not meant to be reversed, although reversal is possible in some cases and up to six percent of vasectomized people request a reversal (Dickey et al., 2015). As with most surgical procedures, a vasectomy is not without risk of complication and side effects, although these risks are small.

Side effects are one potential reason that users may choose another form of contraception over an IUD or vasectomy. Additionally, IUD users may face higher upfront costs than other contraceptive choices. For example, IUDs cost between $760 and $1,101 for the device alone, exclusive of the cost of insertion. Similarly, vasectomies can cost around $1,000 (*Planned Parenthood*, n.d.). However, in 2012, the Affordable Care Act (ACA) mandated that insurance plans cover birth control, including IUDs and vasectomy, without any out-of-pocket costs to the patient. The ACA mandate was effective, and Bearak et al. (2016) shows that while 58 percent of women faced some out-of-pocket costs for contraceptives prior to the mandate, that number dropped to 13 percent by March of 2013. Further, the authors find that the cost estimates also declined; women facing the 90th percentile cost prior to the ACA were expected to pay around $844 during the time of the study, and by January 2013, the 90th percentile cost estimate declined to $169. HB2, the policy studied in this paper, was implemented in July of 2013, and therefore individuals were likely facing low- or no-cost for their procedures during this time period.

2.2. Legislative Framework

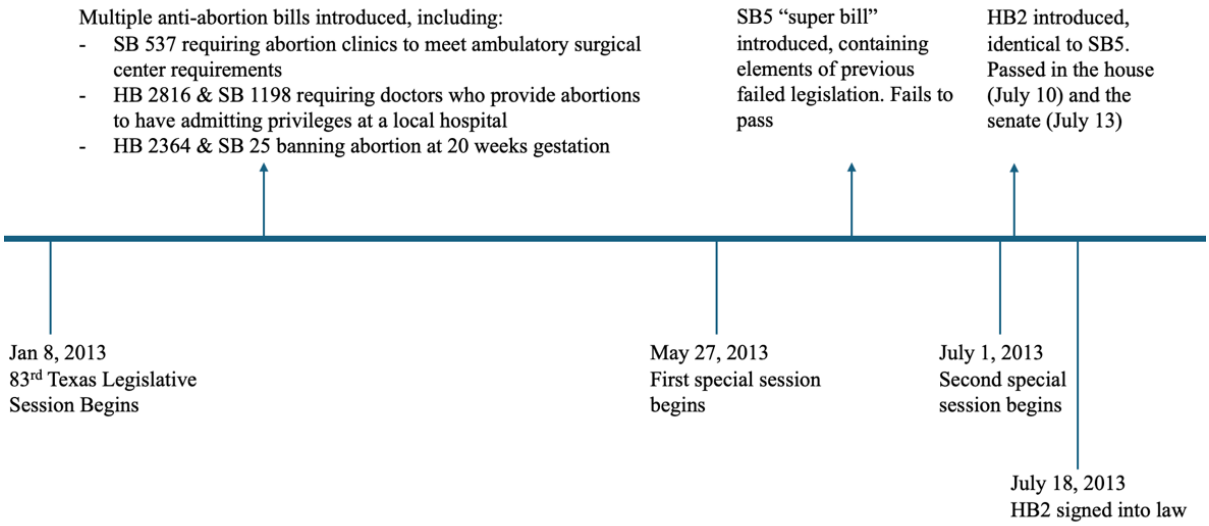
HB2 was passed in July of 2013 after years of state-level policies targeting abortion providers. Prior to HB2, family planning clinics also faced budget cuts, as described by Fischer et al. (2018). In 2011, the Texas government reduced funding for family planning clinics in the 2012-2013 budget by 67 percent. These budget cuts resulted in the closure of 25 percent of family planning clinics in the state in 2012 and other clinics reduced services by limiting hours or eliminating staff (White et al., 2015). Additionally, the Texas government replaced the federal Women's Health Program, a program that provides subsidized women's healthcare for low-income women, with the Texas Women's Health Program. Shifting from a federally funded to a

state funded program allowed the state of Texas to exclude clinics affiliated with an abortion provider from receiving reimbursement through the Women's Health Program. This change was passed in 2011 and went into effect in January of 2013.

HB2 passed after months of highly contentious debate regarding abortion access during the 83rd Texas Legislature. Initially, multiple abortion bills were introduced and failed during the regular legislative session. The controversial bills led to media coverage detailing the strong anti-abortion stance of the legislature and the governor. Governor Rick Perry ordered a special session to begin in late May 2013. During this session, the Texas Senate introduced Senate Bill 5 (SB5), a bill containing many details of the abortion bills that failed to pass in the regular session. When SB5 failed to pass, Governor Perry instituted a second special session to begin in July. SB5 was introduced again as HB2, which passed both houses and was signed into law on July 18, 2013. Because it is essentially identical to SB5, we consider June 2013 to be the original introduction date of HB2 and use this date as the treatment date for our analysis. Figure 1 shows the timeline of events leading to HB2.

Those who supported the bill claimed it would protect women's health by 1) requiring doctors performing abortions to have admitting privileges at a hospital within 30 miles of the clinic, 2) ensuring individuals taking abortion-inducing medication have medical oversight, and 3) mandating that abortion providers meet the standards of an ambulatory surgical center. Opponents of the bill argued that these restrictions, known as targeted regulations on abortion providers, or TRAP laws, would unnecessarily burden clinics to the point of closure, thereby restricting access to legal abortion (Fernandez, 2013).

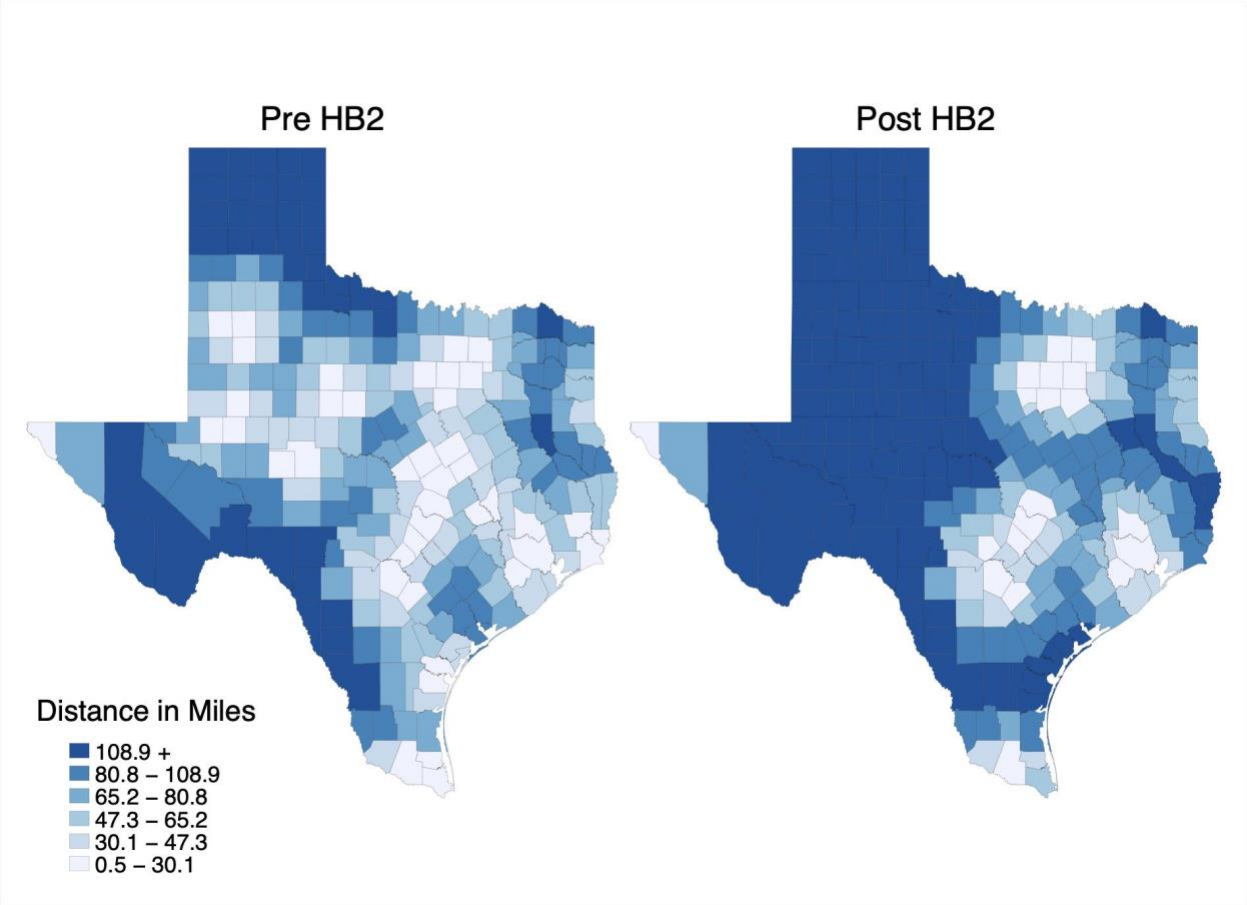
Figure 1: House Bill 2 Legislative Timeline



The first and second mandates of the law went into effect in November of 2013, and the number of abortion clinics in Texas dropped significantly.[3] In 2011, Texas had 42 operating abortion facilities and by the end of 2014, only 17 remained. Before HB2, a majority of Texas residents lived within 100 miles of an abortion provider, and many lived within 30 miles of a provider. After the implementation of HB2, clinic access was concentrated in the metropolitan areas, and many residents faced a journey of over 100 miles to access abortion care, including travel to other states. This change in abortion clinic access not only increased the travel burden for individuals seeking an abortion, but also resulted in congestion and long wait times at the remaining clinics (Lindo et al., 2020).

[3] The mandate that abortion providers meet the standards of an ambulatory surgical center went into effect in the fall of 2014.

Figure 2: Average travel distance to an abortion provider in Texas



Notes: The average travel distance to an abortion provider is calculated at the county-level using Myers (2021). The figure on the left shows the average county-level travel distance to an abortion provider before the introduction of HB2 in June 2013 and the figure on the left shows the average travel distance after HB2. The darker blue represents longer distances.

We show the change in abortion provider access in Figure 2. The left panel shows the average travel distance residents of a particular county face to access their closest abortion provider prior to the passage of HB2. Individuals in the lightest shaded counties have an average travel distance of less than 30 miles and those in the darkest shaded counties have an average travel distance of at least 109 miles. The right panel shows the average travel distance after the

passage of HB2. Much of west and central Texas lose access to a close abortion provider, as shown by the shift in color from light to dark.

3. Data and Descriptive Statistics

To measure changes in the incidence of IUDs and vasectomies in Texas, we use data from the 2011-2015 Texas Health Care Information Collective Outpatient Public Use Data Files (THCIC, 2011-2015). THCIC collects healthcare claims, or invoices submitted to health insurance companies, reported by Texas hospitals and makes the de-identified data available for public use. The data include rich details on each patient claim, such as diagnosis and procedure codes associated with the claim, the timing of the claim at the quarter-year level, and patient demographic information, such as gender, race, and county of residence. All state licensed hospitals, hospital-owned outpatient facilities, and ambulatory surgical centers within the state of Texas are required to report claims, representing 782-956 facilities in each quarter-year.[4] We identify 8,379 IUD insertions or IUD removals with reinsertion and 6,314 vasectomy procedures using relevant Current Procedural Terminology (CPT) codes.

Table 2 also shows stark differences in some demographic features of IUD users and vasectomy recipients in our sample. IUD users are generally younger, with a mean age range of 25 to 29, while vasectomy recipients average between 35 and 39 years old. The primary payer for IUDs is overwhelmingly Medicaid, which typically covers low-income individuals. On the other hand, Medicaid pays for less than 1 percent of vasectomy procedures. Instead, commercial insurance providers cover most vasectomies in the data. Therefore, while IUD users skew younger and likely lower-income in our sample, vasectomy users tend to be older and likely

[4] Small, rural hospitals, such as those located in counties with a population of less than 35,000 or those with fewer than 100 hospital beds are not required to report. Additionally, facilities that do not seek insurance or government reimbursement are not required to report.

higher-income. Given these differences, along with differences in the benefits and efficacy of the procedures, we expect a heterogeneous response in IUD and vasectomy choice following HB2.

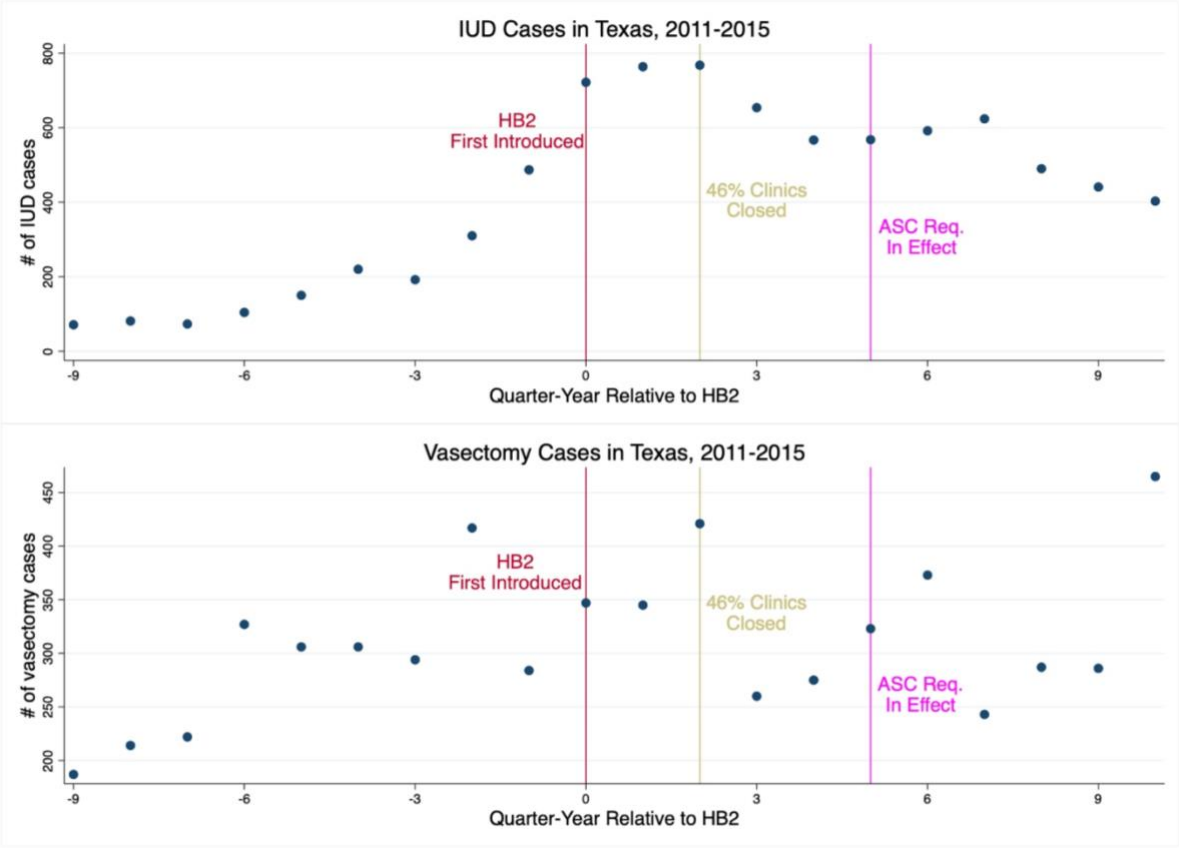
Table 2: Summary Statistics of IUD and Vasectomy Recipients in Texas, 2011-2015

	IUD		Vasectomy	
Variable	**Mean**	**N**	**Mean**	**N**
Age (year category)	25-29	8379	35-39	6314
Race (%)		8379		6309
White	47.50		57.30	
Black	13.78		4.99	
AAPI	3.22		0.87	
American Indian	0.16		0.17	
Other/Unknown	35.34		36.63	
Ethnicity (%)		8371		6290
Hispanic	39.01		17.74	
Non-Hispanic	60.99		82.26	
First Payment Source (%)		8378		6290
Medicaid	25.90		0.52	
Charity, Indigent, or Unknown	27.51		5.78	
Health Maintenance Org.	11.02		8.82	
Commercial Insurance	10.36		37.86	
Blue Cross/Blue Shield	9.41		17.54	
PPO	9.04		23.13	
Other	6.76		6.35	

Source: THCIC (2011-2015)

Figure 3 demonstrates how the incidence of LARC and vasectomies evolved over the study period. The raw trends in IUD cases experience a sharp increase in incidence that coincides with the original introduction of HB2 in June 2013. In the time leading up to the introduction of HB2, the number of IUD insertions increased from around 200 to nearly 800 per quarter. A more modest increase in IUDs occurred following enforcement of the ambulatory surgical center requirement in September 2014.

Figure 3: Trends in IUDs and Vasectomies



Notes: The top figure shows the count of IUD insertions between 2011 and 2015, and the bottom figure shows the quarterly count of vasectomy cases for the same period. Each blue point represents the count of cases in the quarter relative to the introduction of HB2 in June 2013, which is represented by the red line. Additionally, we include a yellow line for the date when 46% of abortion clinics had closed and a pink line for November 2013, the date when the law went into effect.

After the policy changes, the incidence of IUDs declines back toward pre-treatment levels. This is consistent with the hypothesis that people respond to new information about the availability of abortion when making contraceptive choices. Given the durability of IUDs, we do not expect the changes in the incidence of IUDs to persist continuously over time.

Trends in the incidence of vasectomy are relatively noisy, which appear to be driven by strong seasonal effects. Seasonality in vasectomy procedures is well known; Ostrowski et al.

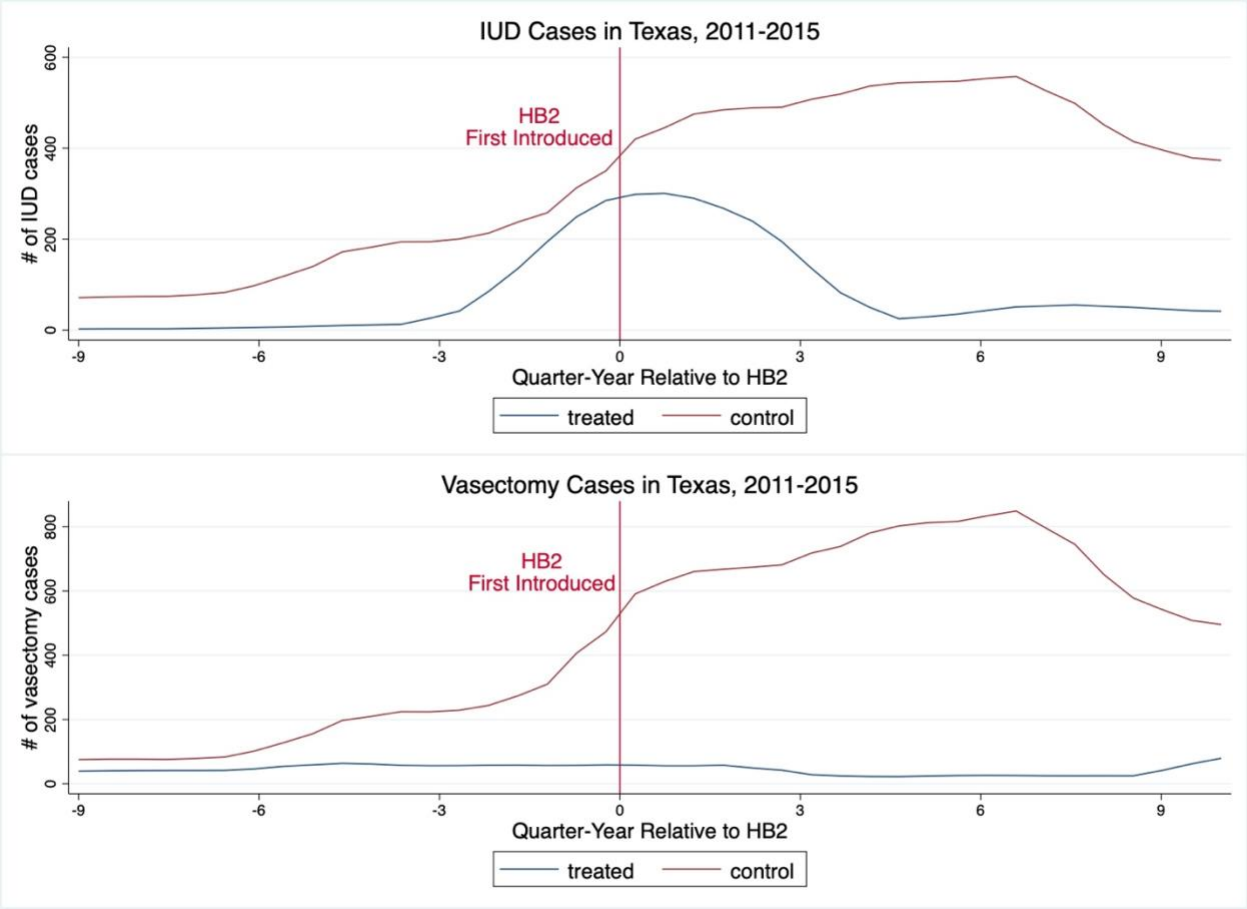
(2018) finds that vasectomy procedures peak at the end of the year when patients have met their insurance deductible. However, even outside of the seasonal effects, it does not appear that these trends are strongly correlated with the timing of abortion legislation.

To determine a measure of treatment from HB2, we use a panel describing the distance to the nearest abortion provider from Myers (2021). Myers (2021) calculates the travel distance (in miles) from the county population centroid to the nearest abortion providing facility in each month from 2009 to 2021. We average these distances across quarter-years and then match the aggregated distance measures to our outcome data for Texas counties from quarter one of 2011 to quarter four of 2015.

Figure 4 plots raw trends in IUDs and vasectomies over time by treatment status, which is defined at the county-level. A county is treated when the distance to an abortion provider increases by more than 30 miles following HB2. Counties that do not experience an increase in the distance to an abortion provider of more than 30 miles are included in the control. This definition of treatment results in 117 treated counties and 137 control counties.

Figure 4 indicates that the incidence of LARC and vasectomies rose substantially during the study period in control counties. This may be indicative of general trends in contraceptive behavior within Texas and could also be associated with the policy change. If people respond to *expectations* of limited abortion access, they may substitute toward long-acting forms of contraception even if they do not experience the loss of an abortion provider as a result of HB2. Though this behavior may potentially bias our estimates, it attenuates our treatment effects toward zero, resulting in more conservative estimates of the effect of HB2 on contraceptive behavior in treated counties.

Figure 4: Trends in IUDs and Vasectomies by Treatment Status



Notes: The top figure depicts trends in IUD insertions relative to June 2013, when HB2 was introduced, while the bottom figure depicts trends in vasectomies. The red trend line shows overall trends in procedures in the control counties, while the blue trend line shows the trends in procedures for the treated counties. Treatment is defined as counties that experience an increase in the distance to an abortion provider of more than 30 miles

Treated counties experience a sharper increase in the number of IUD insertions leading up to the time of the policy change. The trend peaks in the first few months following the introduction and passage of HB2 and then declines back to pre-treatment levels roughly one year after. Interestingly, the incidence of vasectomy is stable and near zero in treated counties across the study period, even though the rate of vasectomies steadily increases in control counties.

Vasectomies do not appear to be a common method of contraception in treated counties, and therefore limiting access to abortion may not influence behavior along this margin.

4. Method and Results

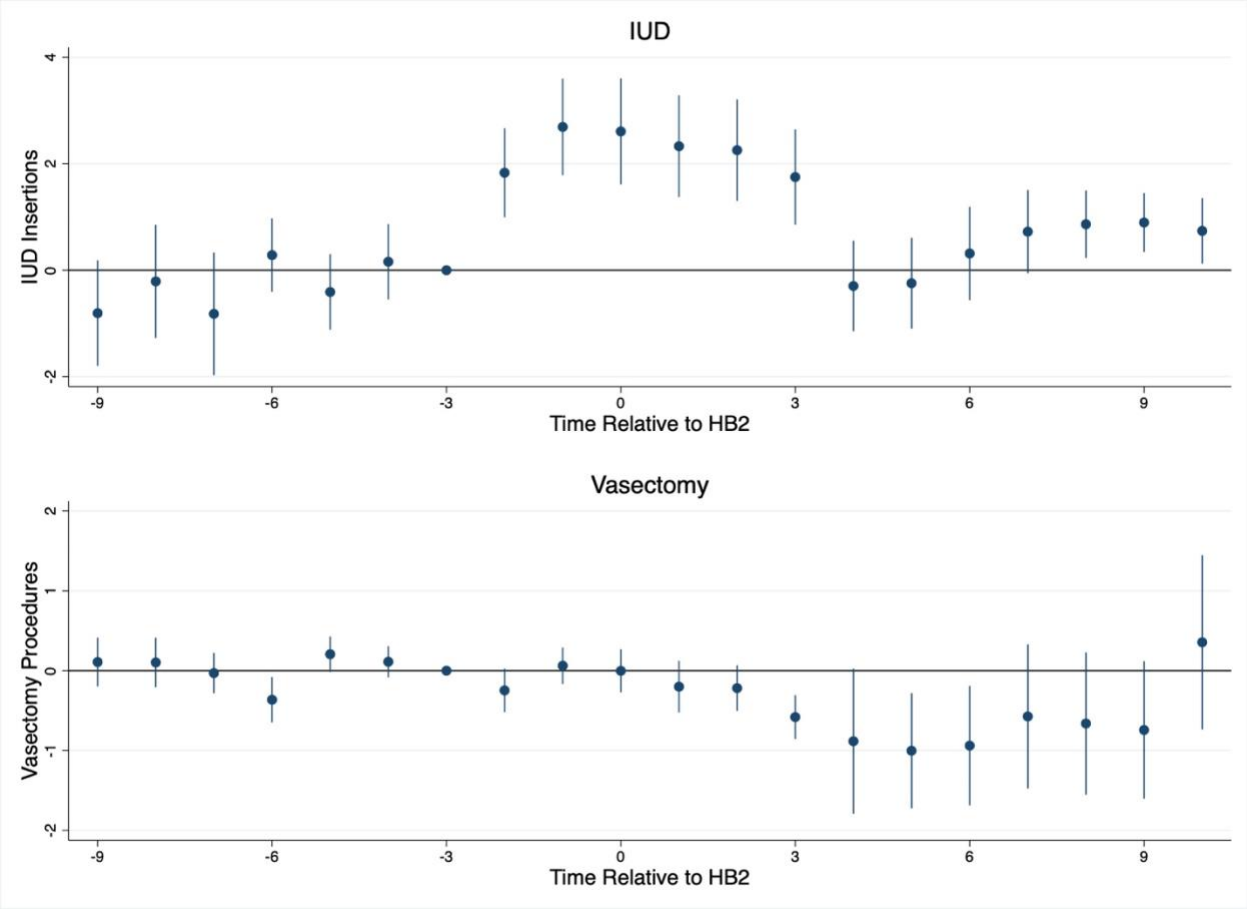
4.1. Main specification

We rely on an event-study design to estimate the effects of restrictive abortion policies on IUD and vasectomy choice. Contentious policy proposals, such as those governing access to abortion, often receive media attention before formal bills are debated in legislative houses. Rees-Jones & Rozema (2023) find this attention can lead to consumption changes in anticipation of changes in the law. Therefore, forward-looking agents may use their perception of expected future abortion access in their present contraceptive decisions. The dynamic specification in Equation (1) permits the observation of these anticipation effects. Because the data contain discrete counts of IUD and vasectomy incidence occasionally equal to zero, we employ a Poisson model that takes the form:

$$\left[E\left[Y_{ct}, \alpha_c, \delta_t, \beta x_{ct}, \sum_{k=-9}^{10} \lambda_k 1(t=k)\right] = \ exp\left(\alpha_c + \delta_t + \beta x_{ct} + \sum_{k=-9}^{10} \lambda_k 1(t=k)\right)\right] \qquad (1)$$

where Y_{ct} is the number of IUDs or vasectomies in county c at quarter-year t, and α_c and δ_t are county and quarter-year fixed effects respectively. Here, k indexes the coefficients λ according to the time relative to the original introduction of HB2 as Senate Bill 5 in the second quarter of 2013. We include controls x_{ct} for the total number of outpatient discharge records for county c in quarter-year t to account for changing overall healthcare utilization across counties over time. The identifying assumption of the event study is that counties in the treated group would have trended similarly to counties in the control group absent the policy intervention.

Figure 5: Poisson Event Studies



Notes: Figure 5 plots the λ_k estimates from Equation 1. Zero represents the introduction of HB2 in June 2013, and each point represents difference in IUD or vasectomy procedures between the treated and control counties relative to three quarters before HB2.

Figure 5 presents the Poisson event-study plots of λ_k for each contraceptive method along with the 90 percent confidence intervals. For IUD insertions, the event plot reveals that trends are parallel between treatment and control counties leading up to three quarters prior to the introduction of HB2. In the two quarters leading up to HB2, IUD insertions increased significantly in treated counties. Notably, this timing coincides with the media coverage of the 2012 state elections and the 83rd legislative session, which is likely driving the anticipation

effects. Treated counties have a higher rate of IUD insertion until one year following the policy change, at which point trends return to close to pre-treatment levels.

Ultimately, IUD insertions increase by an average of 0.616 insertions[5] per county-quarter in the treated counties relative to the control counties immediately surrounding the introduction of the policy change. To put this estimate in perspective, the mean number of IUD insertions in the entire outpatient sample is 1.59 per county-quarter. Among counties with any IUD insertion, the mean is 9.62 insertions per county-quarter. So, our results indicate that counties treated by HB2 increase their incidence of IUD insertion by 6.4% relative to the mean in counties with any IUD insertions. These results are robust to including county-level control variables, including poverty rate, annual household income, and demographics, which we include in Appendix A.3.

In the event plot for vasectomies, trends are parallel leading up to the time of the policy, but there is not strong evidence[6] of an effect for treated counties after the introduction of HB2. The results do indicate a small negative effect in 2014, and this may be explained by the stable trend in vasectomies in treated counties compared to the general increase among the control group, depicted in Figure 4.

4.2. Responding population

Sutton et al. (2021) discuss persistent inequities and disparities among racial and ethnic minorities, potentially driven by implicit bias by healthcare workers, patient mistrust of the healthcare system, differential access to health insurance, high upfront costs of contraceptive

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[5] This value comes from transformation of the Poisson model coefficients where $log(Y_k|policy) - log(Y_k|no\ policy) = k$

[6] While we do not see any effects for vasectomy procedures, it is plausible that individuals seek out vasectomy consultations and ultimately decide against the procedure. In light of recent evidence that shows significant increases in demand for vasectomies after *Dobbs* (Ellison et al., 2024), we test for increased interest in vasectomies using new patient consultations and Google trends. The results, which do not show evidence of increased interest in vasectomies, are included in the Appendix.

care, and other barriers to access. In addition, critics of abortion restrictions note that the burden of these policies fall unequally on vulnerable populations, potentially furthering societal inequities (Fuentes, 2023). We therefore provide descriptive statistics about individuals who seek IUDs after HB2 along with descriptive details of the treated counties. These descriptives allow us to better understand how individuals who seek IUDs in response to abortion clinic closures differ from the general population of IUD users.

Table 3: Comparing IUD recipients in the full sample and treated counties

	(A) All IUD	**(B) Treated Counties**
Variable	**Mean**	**Mean**
Age (year category)	25-29	25-29
Race (%)		
White	47.50	67.64
Black	13.78	11.84
AAPI	3.22	1.11
American Indian	0.16	0.18
Other/Unknown	35.34	19.23
Ethnicity (%)		
Hispanic	39.01	13.50
Non-Hispanic	60.99	86.50
First Payment Source (%)		
Medicaid	25.90	11.20
Charity, Indigent, or Unknown	27.51	1.11
Health Maintenance Org.	11.02	29.54
Commercial Insurance	10.36	22.10
Blue Cross/Blue Shield	9.41	23.04
PPO	9.04	1.64
Other	6.76	11.37

Notes: Table displays the summary statistics for IUD recipients in the full sample (Column A) and IUD recipients in counties that experience a >30-mile increase in their distance to an abortion provider following HB2 (Column B).

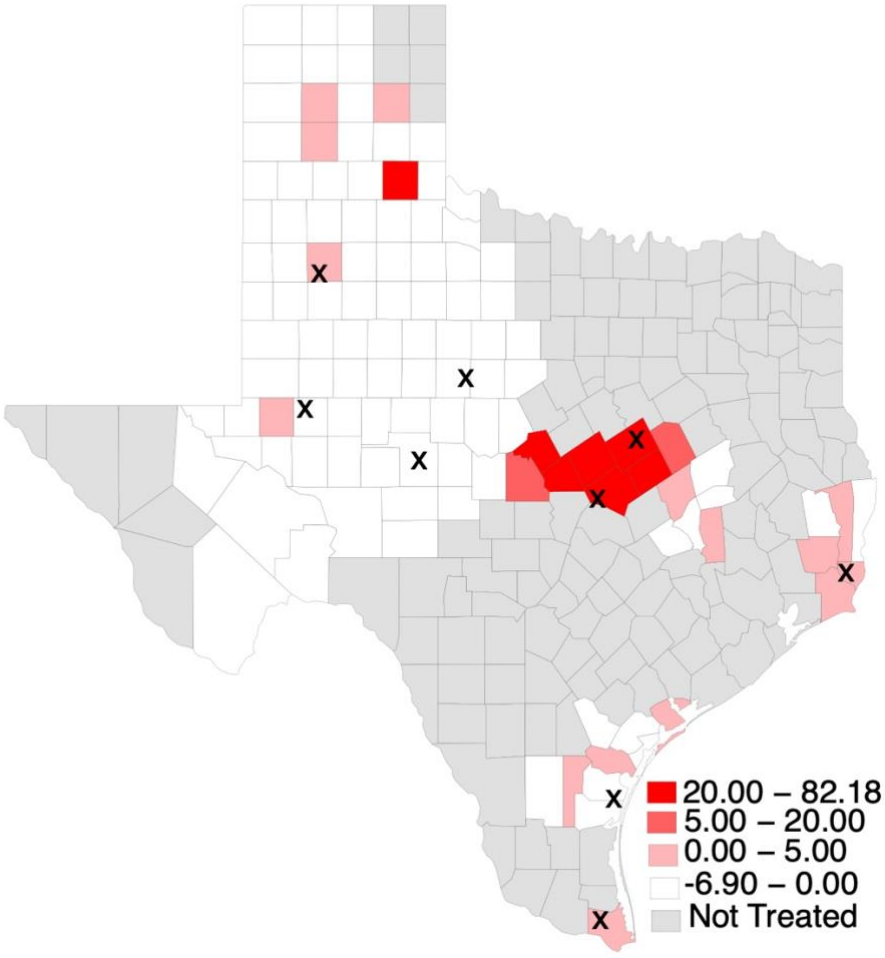
Table 3 shows summary statistics for IUD users throughout Texas (Column (A)) and IUD users in treated counties (Column (B)). The IUD users in treated counties are more likely to be

non-Hispanic, white and are also more likely to pay with commercial health insurance than IUD users more generally. Individuals who do not respond to changes in restrictive abortion policies demographically align with vulnerable populations, suggesting that healthcare disparities may be exacerbated by clinic closures.

Figure 6 is a heat map that describes the 2011-2013 change in the rate of IUD insertion per 10,000 resident females in counties treated by HB2. The largest changes in the rate of IUD insertion following HB2 occur in counties surrounding the metro areas of Waco and Houston, as well as in some of the more densely populated areas of West Texas, Amarillo and Lubbock. Thus, the populations that appear to be responding to the expected change in abortion access are concentrated in suburban counties, rather than in rural areas of the state. In particular, counties that respond the most are often around the locations of specific clinic closures following HB2 (Ura et al., 2016). The dark red cluster in the center of the state represents counties in the immediate vicinity of the closure of Planned Parenthood clinics in Waco and a women's health clinic in Killeen. There are also counties with high insertion rates after HB2 near clinic closures in Beaumont, McAllen, and Corpus Christi.

The differences in responding and non-responding populations reflect known disparities in women's health, which is an area of concern for the American College of Obstetricians and Gynecologists (American College of Obstetricians and Gynecologists), a professional membership organization for obstetricians and gynecologists. Disentangling the mechanisms driving the differences in IUD choice post-HB2 is an area for future research, though descriptive analysis suggests that there is variation in IUD use that may deepen disparities in women's health.

Figure 6: Change in IUD Insertion Rates Among Treated Counties



Notes: The heat map above shows the 2011 to 2013 change in the rate of LARC insertion per 10,000 resident females in counties that are treated by HB2, with darker red represented a larger change in insertions. X's represent clinic closures identified by Ura et al. (2016).

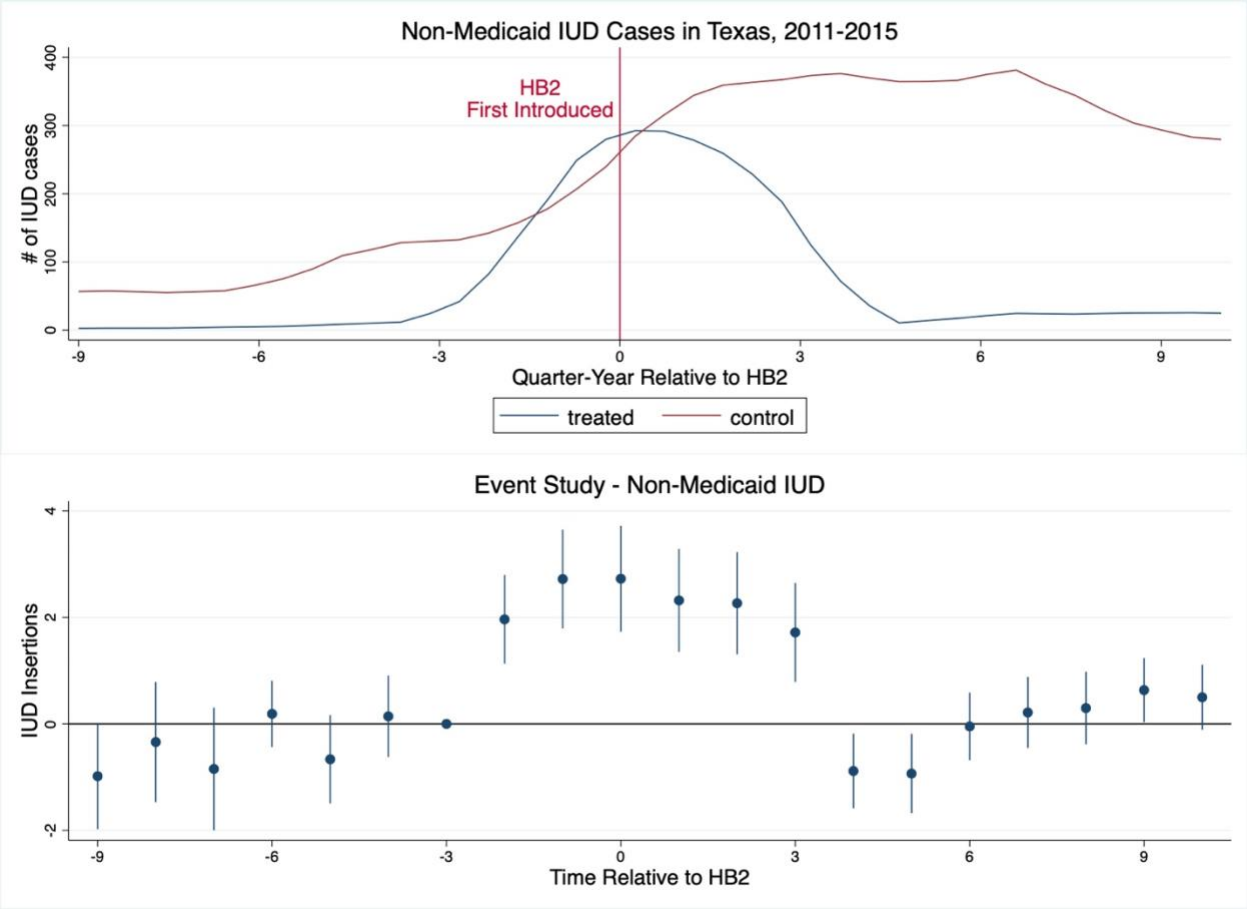
4.3 Exclusion of Medicaid recipients

One limitation of our data is that while we observe IUD insertions and vasectomies in hospital-based outpatient and ASC settings, we do not observe procedures in facilities such as in healthcare clinics without a hospital affiliation or community health centers. Therefore, we are concerned that the observed trends are mechanically driven by changes in reproductive

healthcare in Texas during this time period. As described in Section 2.2, Texas excluded sexual health clinics that are affiliated with or make referrals to abortion providers from receiving Medicaid reimbursement. At the same time, Texas dramatically cut its funding for family planning clinics. Lastly, many abortion clinics that also provide family planning services may have closed due to the implementation of HB2 in mid-2013. All three policies could cause people to switch from care in independent clinics toward hospital-owned facilities, resulting in a false conclusion that take-up of these contraceptive methods increased in the state overall. We make efforts to explore the possibility that these mechanisms confound our estimates. In this section, we repeat the estimation for IUD insertions while only considering non-Medicaid cases. In Section 4.3, we consider the effect on visits to a gynecologist.

The decision to exclude family planning clinics from receiving reimbursement from the Texas Women's Health Program and the budget cuts that led to dramatic family planning clinic shutdowns could drive Medicaid recipients from independent family planning clinics, such as Planned Parenthood affiliates, toward hospital-based outpatient facilities. If this facility shift occurs primarily in the group of counties we identify as treated by HB2, it would result in increases in LARC in our data that we falsely attribute to restricted abortion access. Fischer et al., (2018) show that there is little correlation between increased distance to an abortion provider following HB2 and restricted access to publicly funded family planning clinics after the change to the Texas Women's Health Program. In our data, we repeat the event study analysis for IUD insertions in Equation (1) excluding Medicaid recipients from our sample.

Figure 7: Trends and Event Study – Non-Medicaid IUD



Notes: The top panel of this figure shows trends in IUD procedures, excluding individuals who were covered by Medicaid. The bottom panel shows the λ_k coefficients from Equation 1 using only individuals who received an IUD and did not have Medicaid.

Figure 7 shows that excluding Medicaid recipients does not fundamentally shift the trends between treatment and control counties, or the estimates shown in the event plot, therefore providing evidence that Medicaid recipients are not shifting changes in IUD insertion around the timing of HB2. This supports a conclusion that the family planning clinic budget cuts and changes to the Texas Women's Health Program are unlikely to cause the increases in IUD insertions we observe for counties that experience increased distance to an abortion provider following HB2.

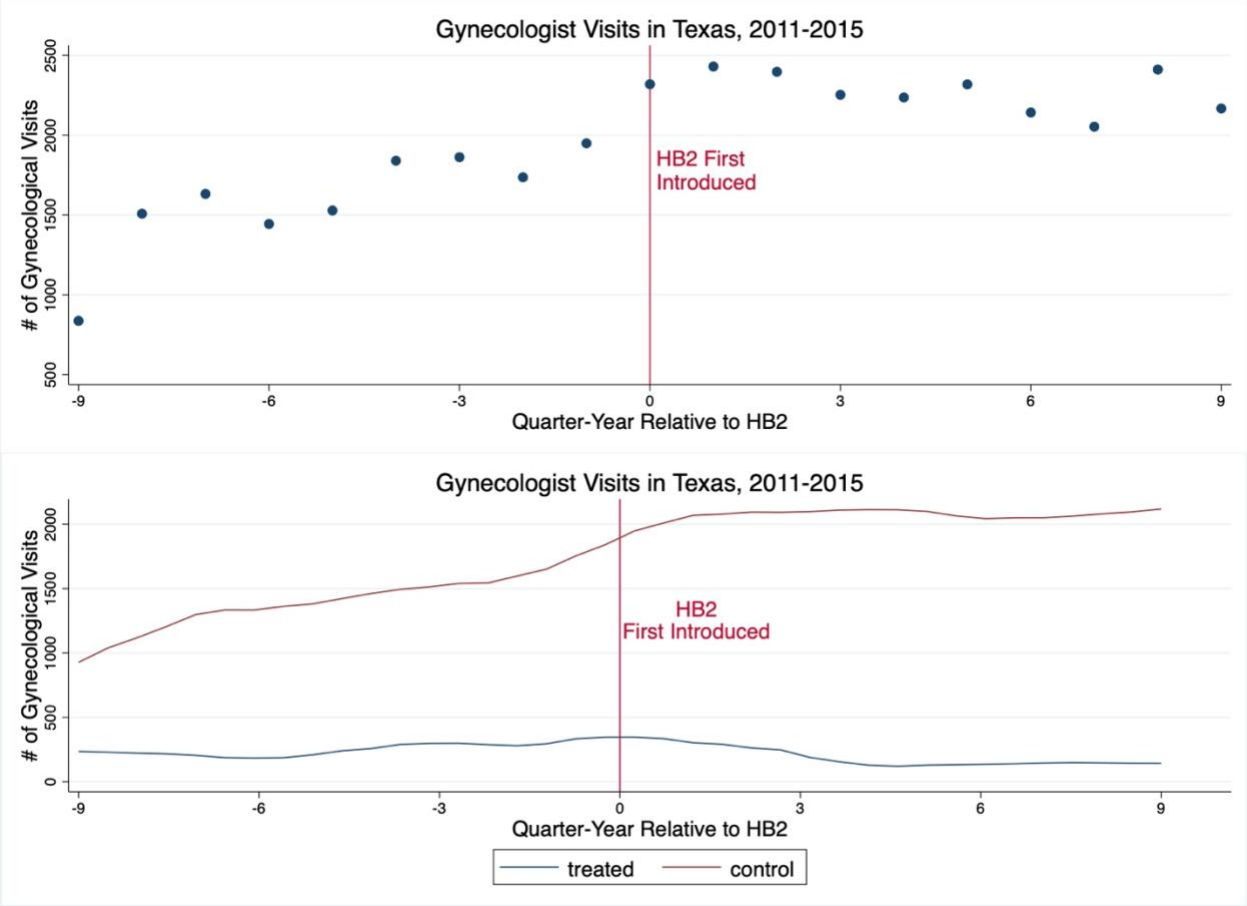
4.4 Gynecological Visits

While abortion care receives much of the attention, family planning clinics often provide other services, such as general reproductive health checkups, contraception, prenatal care, and cancer screenings. Therefore, policies that cause abortion clinics to close may also reduce access to all other services provided by the clinics. In the Myers (2021) data describing the distance to an abortion provider, "closures" indicate facilities that shut down or simply stopped providing abortion care. Facilities that continue to operate without providing abortions would not influence the access to contraceptive care for residents of that county. On the other hand, complete facility closures may drive the population served by that facility to seek contraceptive care elsewhere. In other words, if an individual regularly seeks care at a family planning clinic that is not observed in our data, then that clinic closes as a result of HB2 and the individual switches to a hospital-owned facility in our data, we may see a mechanical increase in IUD incidence and falsely attribute this change to HB2. While this response is a consequence of HB2, it is not necessarily related to abortion access. Therefore, this behavior may be confounding our central research question.

We explore the possibility that people in areas experiencing facility closures shift their care to a hospital-owned facility or ASC in our data by observing trends in other reproductive health services unrelated to contraception. In Figure 8, we plot the average trend and the trends by treatment status for women's health screenings over the study period. If people are making a fundamental shift in their facility for care, we would expect to see corresponding increases in visits to the gynecologist after clinic closures due to HB2, concentrated in treated counties. Trends demonstrate that the overall incidence of women's health screenings did increase over the

study period, but this increase occurs almost exclusively in the control group. Among treated counties, the incidence of women's health screenings is stable. So, it does not appear that residents of counties affected by HB2 systematically shift to receive healthcare in hospital-owned and ASC facilities.

Figure 8: Trends in General Gynecologist Visits



Notes: The top figure shows general trends in visits to the gynecologist from 2011-2015. Each blue dot represents the county of visits in each quarter-year, and the vertical red line represents June 2013, when HB2 was introduced. The bottom figure shows the number of gynecologist visits in the treated counties, represented by the blue trend line, and control counties, represented by red trend line. Like the figure above, the vertical red line represents June 2013.

5. Conclusion

In this paper, we measure the effect of restricted abortion access in Texas on the incidence of hospital-based IUDs and vasectomies. For identification, we exploit the within-state geographic variation in the distance to a nearest abortion provider following the 2013 passage of HB2, a TRAP law that shut down over half of all abortion clinics in Texas. We find that counties with an increase in their travel distance to an abortion provider greater than 30 miles experience an average increase of 0.616 IUD insertions per county-quarter in treated counties around the time of the policy change. Overall, this amounts to roughly 432 additional IUD insertions during our sample period, representing 5.15 percent of total hospital-based IUD cases between 2011 and 2015. We do not find evidence that counties affected by HB2 experience increases in the take-up of vasectomies.

A primary threat to identification is that our data on outpatient procedures only includes discharge records for IUDs and vasectomies that occurred in a hospital-owned facility or ambulatory surgical center. As such, our results may be biased by changes in the location of care resulting from these policies. However, we argue that the public policy environment in Texas did not significantly shift the location of care in the state from independent clinics toward hospital-owned facilities and conduct additional tests to ensure the robustness of our results. Our results are robust to the exclusion of Medicaid recipients from the sample, a population that experienced reduced access to contraceptive care in publicly funded clinics after changes to the reimbursement structure for the state Women's Health Program in 2012. In addition, we do not find evidence that counties affected by the abortion clinic closures following HB2 increased the number of hospital-based general gynecologist visits, supporting a conclusion that individuals in

these counties did not make large changes in their location of reproductive healthcare during the study period.

To our knowledge, our study is the first in the United States to provide empirical evidence supporting the hypothesis that abortion and IUDs are substitutes. We also explore the potential for this substitutability to extend to vasectomies, an arguably permanent method of contraception. We find that the incidence of vasectomies does not significantly increase in counties treated by the policy change, suggesting that the additional cost of abortion may not pass through to people who cannot become pregnant. This is in contrast to a recent article showing that vasectomies increased by 29 percent in the three months after the *Dobbs* ruling (The Economist, 2023). The article claims that these effects are more concentrated in states with trigger laws and Texas saw an increase of over 40 percent. Ellison et al. (2024) finds similar increases in permanent contraception after *Dobbs*, however they find that the increase in tubal ligation was nearly double that of vasectomy. Therefore, although we do not see an increase in vasectomy procedures after the HB2 policy change, this conclusion may not hold for the *Dobbs* decision. Regardless, it appears that restricting abortion increases contraception use more for those who can bear children.

Our study has a few key limitations. When presented with new information, people may respond to changes in their expectation of abortion access in the future, regardless of realized restrictions in access. In this way, people across the entire state of Texas may be influenced by the media surrounding abortion access during the 83rd legislative session, and therefore defining a treatment group to only include counties affected by abortion clinic closures may be too narrow. So, we consider our treatment effects to be conservative estimates of changing contraceptive behavior. Additionally, we only measure the effects of abortion access on a subset

of contraceptive options. According to the Guttmacher Institute (2021) LARC is the third most common contraceptive method among contraceptive users aged 15-48, behind sterilization (27.7 percent) and the pill (21.4 percent). More research is necessary to determine the influence of abortion access on the take-up of all types of contraception, rather than LARC broadly. Finally, our study relies on variation in abortion access in a single US state. Although Texas is populous, it contains only 8.9 percent of the total US population, and results may not be generalizable to the entire country.

Bibliography

American College of Obstetricians and Gynocologists. (n.d.). *Our Commitment to Changing the Culture of Medicine and Eliminating Racial Disparities in Womens Health Outcomes*. Retrieved July 16, 2024, from https://www.acog.org/about/our-commitment-to-changing-the-culture-of-medicine-and-eliminating-racial-disparities-in-womens-health-outcomes

Ananat, E. O., & Hungerman, D. M. (2012). The Power of the Pill for the Next Generation: Oral Contraception's Effects on Fertility, Abortion, and Maternal and Child Characteristics. *The Review of Economics and Statistics*, *94*(1), 37–51. https://doi.org/10.1162/REST_a_00230

Bailey, M. J. (2005). *More Power to the Pill: The Impact of Contraceptive Freedom on Women's Labor-Force Participation* (SSRN Scholarly Paper 652521). https://doi.org/10.2139/ssrn.652521

Bailey, M. J. (2010). "Momma's Got the Pill": How Anthony Comstock and *Griswold v. Connecticut* Shaped US Childbearing. *American Economic Review*, *100*(1), 98–129. https://doi.org/10.1257/aer.100.1.98

Bailey, M. J. (2013). *Fifty Years of Family Planning: New Evidence on the Long-Run Effects of Increasing Access to Contraception* (Working Paper 19493). National Bureau of Economic Research. https://doi.org/10.3386/w19493

Bearak, J. M., Finer, L. B., Jerman, J., & Kavanaugh, M. L. (2016). Changes in out-of-pocket costs for hormonal IUDs after implementation of the Affordable Care Act: An analysis of insurance benefit inquiries. *Contraception*, *93*(2), 139–144. https://doi.org/10.1016/j.contraception.2015.08.018

Colman, S., Dee, T. S., & Joyce, T. (2013). Do parental involvement laws deter risky teen sex? *Journal of Health Economics*, *32*(5), 873–880. https://doi.org/10.1016/j.jhealeco.2013.06.003

Contraceptive Use in the United States by Method | Guttmacher Institute. (2021, April 7). https://www.guttmacher.org/fact-sheet/contraceptive-method-use-united-states

Dickey, R. M., Pastuszak, A. W., Hakky, T. S., Chandrashekar, A., Ramasamy, R., & Lipshultz, L. I. (2015). The Evolution of Vasectomy Reversal. *Current Urology Reports*, *16*(6), 40. https://doi.org/10.1007/s11934-015-0511-0

Ellison, J. E., Brown-Podgorski, B. L., & Morgan, J. R. (2024). Changes in Permanent Contraception Procedures Among Young Adults Following the Dobbs Decision. *JAMA Health Forum*, *5*(4), e240424. https://doi.org/10.1001/jamahealthforum.2024.0424

Farin, S. M., Hoehn-Velasco, L., & Pesko, M. (2021). *The Impact of Legal Abortion on Maternal Mortality* (SSRN Scholarly Paper 3913899). https://doi.org/10.2139/ssrn.3913899

Felkey, A., & Lybecker, K. M. (2017). Do Abortion Restrictions Make Young Women More Reproductively Responsible? The Case of US Abortion Legislation. *PAA. April*, *28*. https://paa.confex.com/paa/2017/mediafile/ExtendedAbstract/Paper11741/PAA%20Extended%20Abstract--Youth.pdf

Fernandez, M. (2013, June 26). Filibuster in Texas Senate Tries to Halt Abortion Bill. *The New York Times*. https://www.nytimes.com/2013/06/26/us/politics/senate-democrats-in-texas-try-blocking-abortion-bill-with-filibuster.html

Fischer, S., Royer, H., & White, C. (2018). The impacts of reduced access to abortion and family planning services on abortions, births, and contraceptive purchases. *Journal of Public Economics*, *167*, 43–68. https://doi.org/10.1016/j.jpubeco.2018.08.009

Fuentes, L. (2023, January 12). *Inequity in US Abortion Rights and Access: The End of Roe Is Deepening Existing Divides | Guttmacher Institute*. https://www.guttmacher.org/2023/01/inequity-us-abortion-rights-and-access-end-roe-deepening-existing-divides

Goldin, C., & Katz, L. F. (2002, August). *The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions | Journal of Political Economy: Vol 110, No 4*. https://www.journals.uchicago.edu/doi/abs/10.1086/340778

Guldi, M. (2008). Fertility effects of abortion and birth control pill access for minors. *Demography*, *45*(4), 817–827. https://doi.org/10.1353/dem.0.0026

Jones, K. M., & Pineda-Torres, M. (2024). TRAP'd Teens: Impacts of abortion provider regulations on fertility & education. *Journal of Public Economics*, *234*, 105112. https://doi.org/10.1016/j.jpubeco.2024.105112

Kane, T. J., & Staiger, D. (1996). *Teen Motherhood and Abortion Access* | The Quarterly Journal of Economics | Oxford Academic*. https://academic.oup.com/qje/article-abstract/111/2/467/1938396

Kheyfets, A., Dhaurali, S., Feyock, P., Khan, F., Lockley, A., Miller, B., Cohen, L., Anwar, E., & Amutah-Onukagha, N. (2023). The impact of hostile abortion legislation on the United States maternal mortality crisis: A call for increased abortion education. *Frontiers in Public Health*, *11*, 1291668. https://doi.org/10.3389/fpubh.2023.1291668

Kirstein, M., Dreweke, J., Jones, R. K., & Philbin, J. (2022, October 3). *100 Days Post-Roe: At Least 66 Clinics Across 15 US States Have Stopped Offering Abortion Care | Guttmacher Institute*. https://www.guttmacher.org/2022/10/100-days-post-roe-least-66-clinics-across-15-us-states-have-stopped-offering-abortion-care

Klick, J., Neelsen, S., & Stratmann, T. (2012). The Relationship between Abortion Liberalization and Sexual Behavior: International Evidence. *American Law and Economics Review*, *14*(2), 457–487. https://doi.org/10.1093/aler/ahs012

Lindo, J. M., Myers, C. K., Schlosser, A., & Cunningham, S. (2020). How Far Is Too Far?: New Evidence on Abortion Clinic Closures, Access, and Abortions. *Journal of Human Resources*, *55*(4), 1137–1160. https://doi.org/10.3368/jhr.55.4.1217-9254R3

Lindo, J. M., & Packham, A. (2017). How Much Can Expanding Access to Long-Acting Reversible Contraceptives Reduce Teen Birth Rates? *American Economic Journal: Economic Policy*, *9*(3), 348–376. https://doi.org/10.1257/pol.20160039

Miller, G., & Valente, C. (2016). Population Policy: Abortion and Modern Contraception Are Substitutes. *Demography*, *53*(4), 979–1009. https://doi.org/10.1007/s13524-016-0492-8

Miller, S., Wherry, L. R., & Foster, D. G. (2023). The Economic Consequences of Being Denied an Abortion. *American Economic Journal: Economic Policy*, *15*(1), 394–437. https://doi.org/10.1257/pol.20210159

Myers, C. K. (2021, July). *Measuring the Burden: The Effect of Travel Distance on Abortions and Births*. https://www.iza.org/publications/dp/14556/measuring-the-burden-the-effect-of-travel-distance-on-abortions-and-births

Myers, C., & Ladd, D. (2020). Did parental involvement laws grow teeth? The effects of state restrictions on minors' access to abortion. *Journal of Health Economics*, *71*, 102302. https://doi.org/10.1016/j.jhealeco.2020.102302

Ostrowski, K. A., Holt, S. K., Haynes, B., Davies, B. J., Fuchs, E. F., & Walsh, T. J. (2018). Evaluation of Vasectomy Trends in the United States. *Urology*, *118*, 76–79. https://doi.org/10.1016/j.urology.2018.03.016

Rees-Jones, A., & Rozema, K. (2023). Price Isn't Everything: Behavioral Response Around Changes In Sin Taxes. *National Tax Journal*, *76*(1), 5–35. https://doi.org/10.1086/723093

Schwingl, P. J., & Guess, H. A. (2000). Safety and effectiveness of vasectomy. *Fertility and Sterility*, *73*(5), 923–936. https://doi.org/10.1016/S0015-0282(00)00482-9

Sonfield, A. (2015, November 9). *Popularity Disparity: Attitudes About the IUD in Europe and the United States | Guttmacher Institute*. https://www.guttmacher.org/gpr/2007/11/popularity-disparity-attitudes-about-iud-europe-and-united-states

Stevenson, A. J., Coleman-Minahan, K., & Hays, S. (2020). Denials of Judicial Bypass Petitions for Abortion in Texas Before and After the 2016 Bypass Process Change: 2001–2018. *American Journal of Public Health*, *110*(3), 351–353. https://doi.org/10.2105/AJPH.2019.305491

Sutton, M. Y., Anachebe, N. F., Lee, R., & Skanes, H. (2021). Racial and Ethnic Disparities in Reproductive Health Services and Outcomes, 2020. *Obstetrics & Gynecology*, *137*(2), 225. https://doi.org/10.1097/AOG.0000000000004224

Texas Hospital Inpatient Discharge Public Use Data File. (2011-2015). *Texas Department of State Health Services Austin, Texas*. Retrieved July 14, 2024, from https://www.dshs.texas.gov/texas-health-care-information-collection

The Economist. (2023, May 25). Vasectomies rose by 29% in the three months after the end of Roe. *The Economist*. https://www.economist.com/united-states/2023/05/25/vasectomies-rose-by-29-in-the-three-months-after-the-end-of-roe?utm_medium=cpc.adword.pd&utm_source=google&ppccampaignID=17210591673&ppcadID=&utm_campaign=a.22brand_pmax&utm_content=conversion.direct-

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Tyler, C. P., Whiteman, M. K., Zapata, L. B., Curtis, K. M., Hillis, S. D., & Marchbanks, P. A. (2012). Health Care Provider Attitudes and Practices Related to Intrauterine Devices for Nulliparous Women. *Obstetrics & Gynecology*, *119*(4), 762. https://doi.org/10.1097/AOG.0b013e31824aca39

Ura, A., Murphy, R., Danie, A., & Carbonell, L. (2016, June 28). *Texas Abortion Clinics That Have Closed Since 2013 | The Texas Tribune*. https://www.texastribune.org/2016/06/28/texas-abortion-clinics-have-closed-hb2-passed-2013/

Venator, J., & Fletcher, J. (2021). Undue Burden Beyond Texas: An Analysis of Abortion Clinic Closures, Births, and Abortions in Wisconsin. *Journal of Policy Analysis and Management*, *40*(3), 774–813. https://doi.org/10.1002/pam.22263

Where Can I Buy a Vasectomy & How Much Will It Cost? (n.d.). Retrieved July 14, 2024, from https://www.plannedparenthood.org/learn/birth-control/vasectomy/how-do-i-get-vasectomy

White, K., Hopkins, K., Aiken, A. R. A., Stevenson, A., Hubert, C., Grossman, D., & Potter, J. E. (2015). The Impact of Reproductive Health Legislation on Family Planning Clinic Services in Texas. *American Journal of Public Health*, *105*(5), 851–858. https://doi.org/10.2105/AJPH.2014.302515

Appendix

A.1 Linear specification

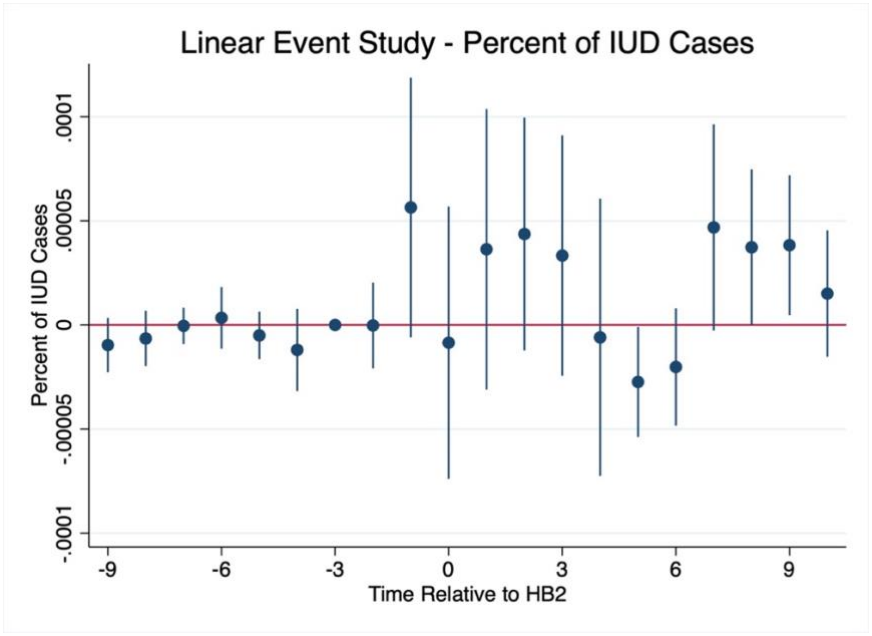
We repeat our main event-study specification using a linear specification, rather than a Poisson. The model takes the following form:

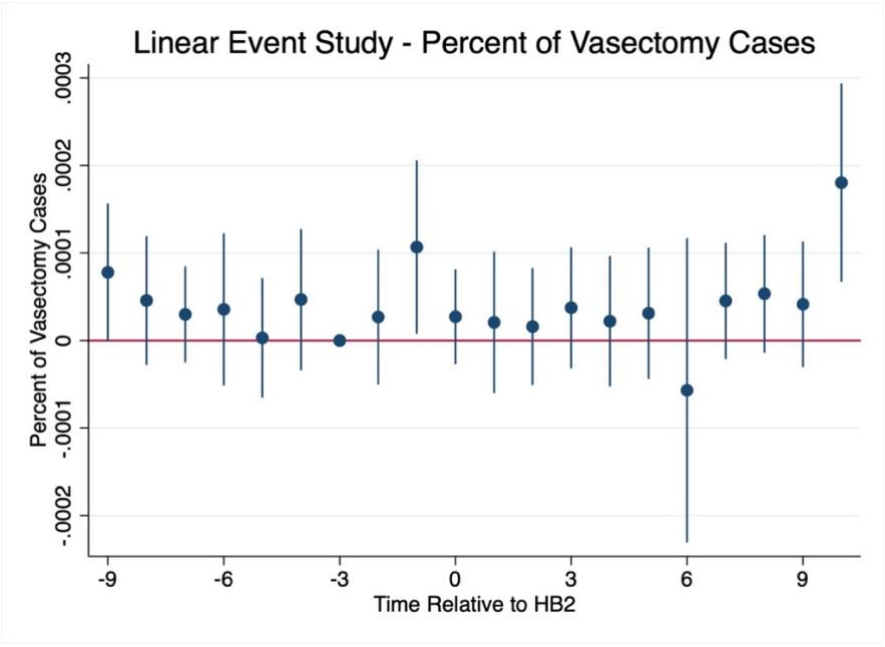
$$Y_{ct} = \alpha_c + \delta_t + \beta x_{ct} + \sum_{k=-9}^{10} \lambda_k 1(t = k)$$

(1)

Y_{ct} is the number of IUDs or vasectomies in county c at quarter-year t, α_c and δ_t are county and quarter-year fixed effects respectively, and x_{ct} is the total number of outpatient discharge records for county c in quarter-year t. Again, k indexes the coefficients λ according to the time relative to the original introduction of HB2 as Senate Bill 5 in 2013 quarter 2. Figure A1 displays the results of the linear specification.

Appendix Figure 1: Linear event studies



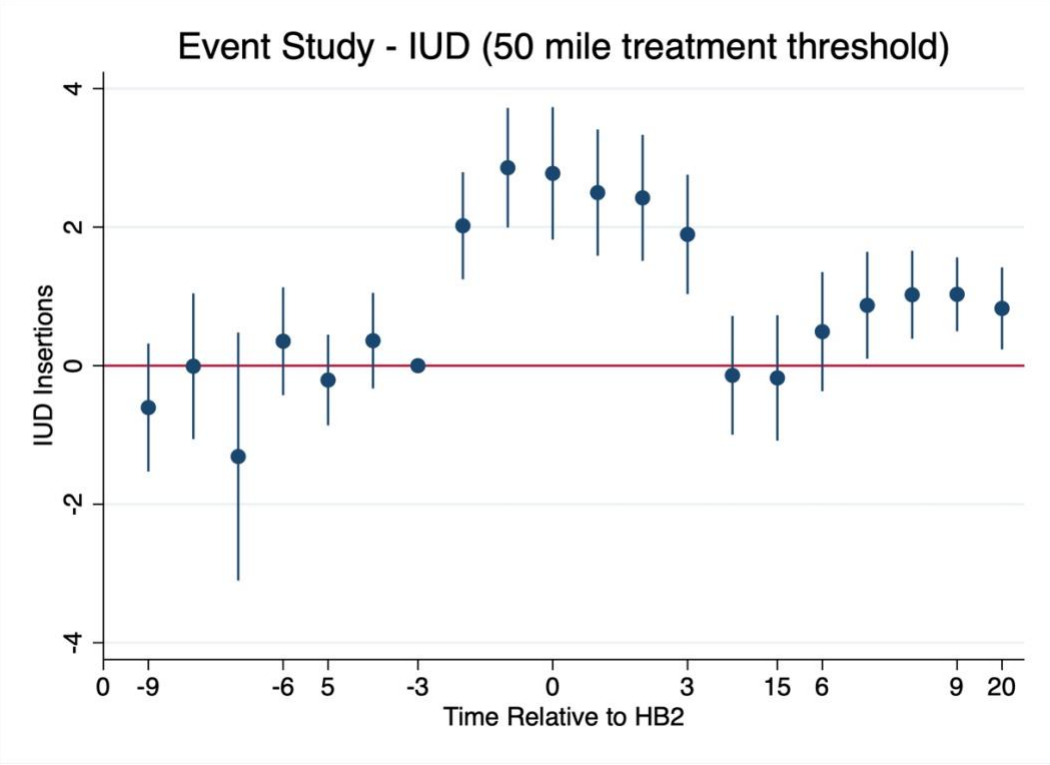


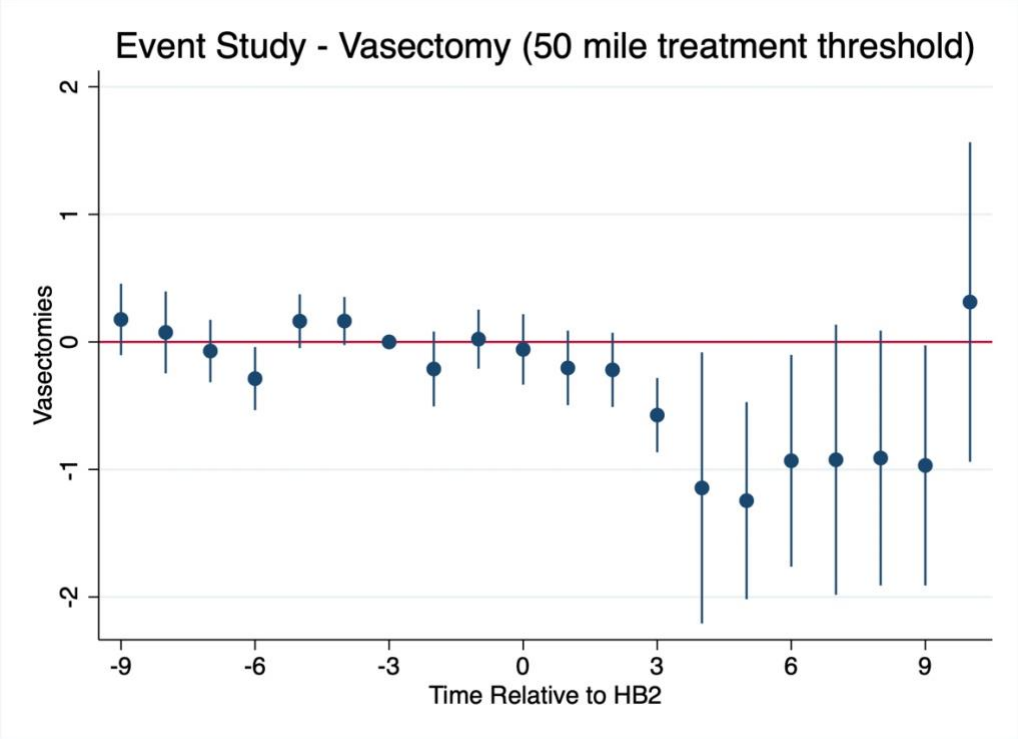
Notes: The figure shows the results of a linear specification that estimates the change in IUD insertions (top) or vasectomies (bottom) in the treated counties relative to the control counties after the introduction of HB2.

A.2 Sensitivity to Treatment Definition

We test for the sensitivity of our analysis to different thresholds by looking at increases in the distance to the nearest abortion provider of more than 50 miles and more than 100 miles. For the 50-mile threshold, we exclude counties that experience an increase between 30-49 miles. This allows us to limit the bias that would be introduced if we considered these counties as part of the control group. The results of this analysis are in Figure A2 and are consistent with the greater than 30-mile threshold for all three outcomes, suggesting that the results are not sensitive to an increase of greater than 50 miles to an abortion provider.

Appendix Figure 2: Poisson event study; 50-mile treatment threshold

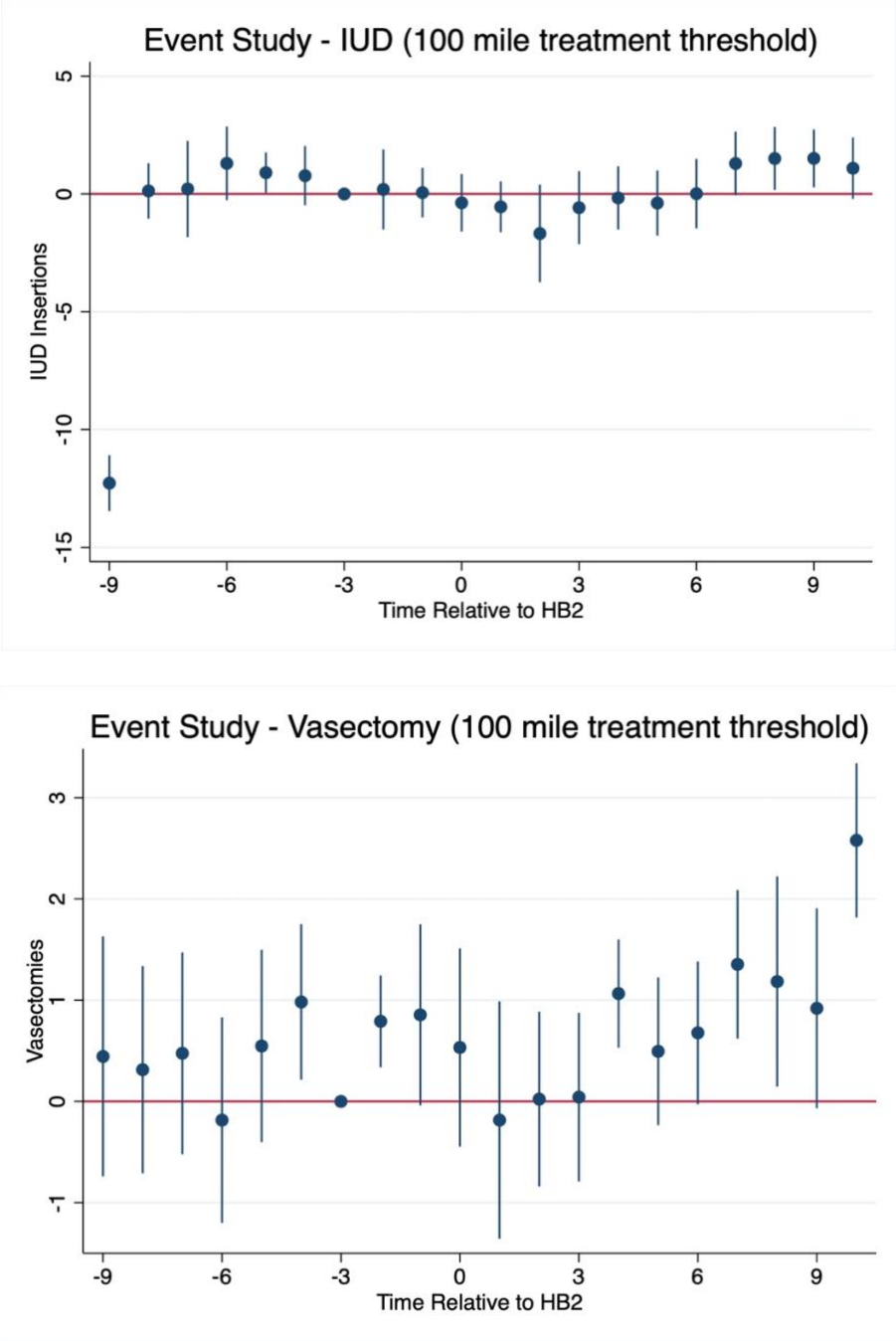




Notes: Similar to Figure 5, this figure plots the λ_k estimates from Equation 1 but uses a 50-mile treatment threshold. Counties with a greater-than-50-mile change in distance to an abortion provider are considered treated. These estimates exclude counties with an increase of 30-49 miles.

Figure A3 shows the results of an event study using an increase of greater than 100 miles as the threshold distance. As with the greater than 50-mile threshold estimation used to create Figure A2, we exclude individuals who experience an increase of 30-99 miles to the nearest abortion provider.

Appendix Figure 3: Poisson event study; 100-mile treatment threshold



Notes: This figure repeats the estimates from Equation 1 but uses a 100-mile treatment threshold and excludes counties an increase of 30-99 miles.

The event plots are quite different under the 100-mile threshold and are much noisier. Of note, 86 percent of our response group come from just three suburban counties around Waco. When we limit our analysis to just those counties who experience a greater than 100-mile increase, we drop these suburban counties from the analysis. On the other hand, LARC activity is rare in counties that experience a greater than 100-mile increase in distance. For example, the average number of IUD insertions is 1.08 per county-quarter, but when we limit to only counties experiencing a greater than 100-mile increase in distance from an abortion provider, the average number of IUD insertions is 0.13 per county-quarter. This could explain why the event studies for the greater than 100-mile treatment group are quite noisy.

A.3 County Controls

In this section, we include information on county controls used as a robustness check. Table A1 presents county-population-level summary statistics for treated and untreated counties. As explained in Section 4, counties are treated if the distance to an abortion provider increased more than 30 miles following HB2.

Treated counties have smaller average populations than untreated counties, along with a slightly higher proportion of residents who identify as white or Hispanic, and a slightly lower proportion of residents who identify as Black. The proportion of the total population that is within the age range of 20-49 is similar between both treated and untreated counties. Finally, treated counties have a lower unemployment rate and median household income, but higher income per capita.

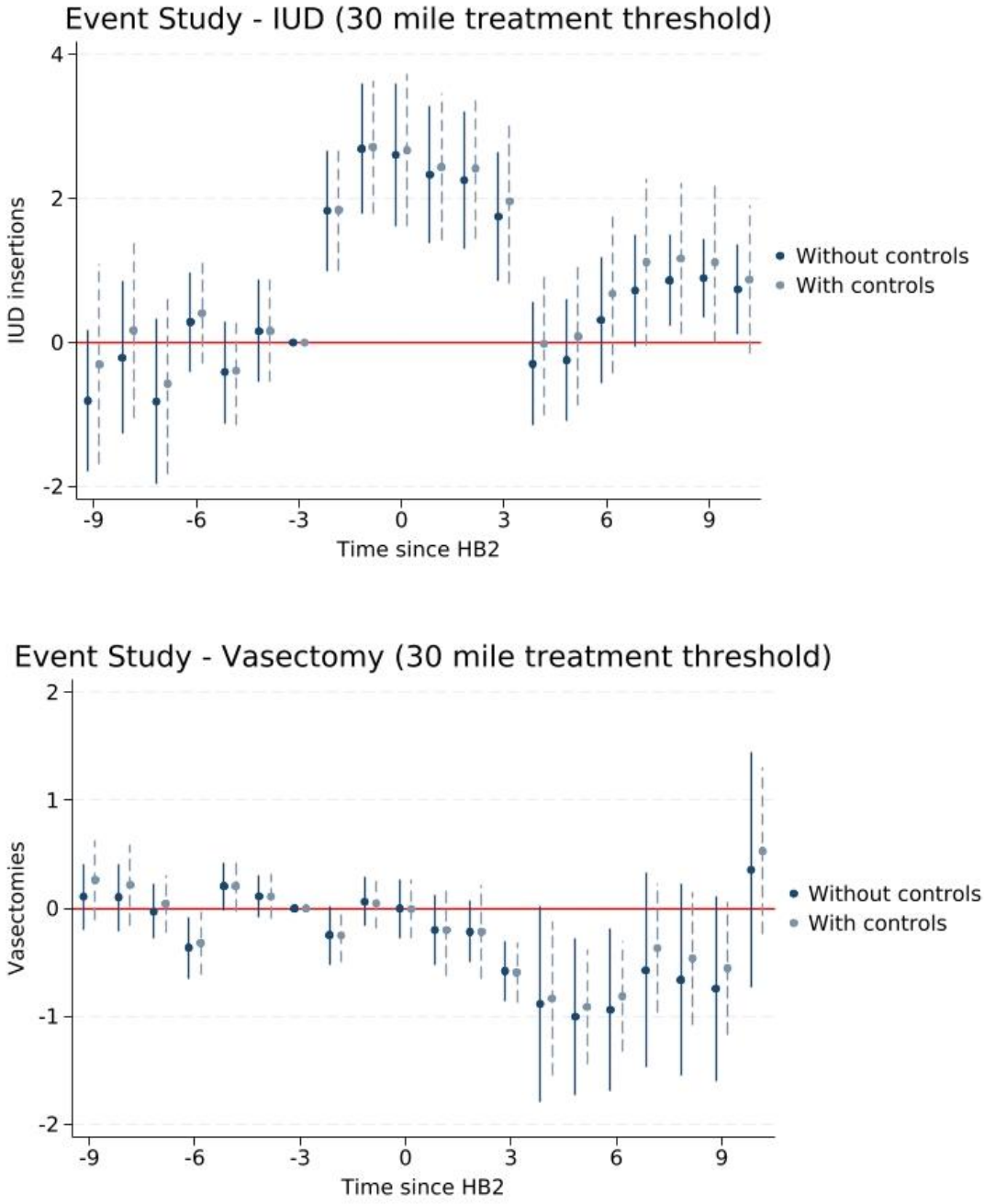
Table 1A: Summary Statistics for Treated and Untreated Counties

	Treated		Untreated	
Variable	Mean	County-Years	Mean	County-Years
County Population	36,479	2,338	163,756	2,740
Race (%)				
White	92.11		89.81	
Black	6.27		8.25	
Hispanic	36.14		31.68	
Gender (%)				
Female 20-29	5.67		5.79	
Female 30-39	5.49		5.65	
Female 40-49	5.71		6.09	
Male 20-29	7.29		6.53	
Male 30-39	6.46		5.94	
Male 40-49	6.22		6.21	
Employment and Income				
Unemployment Rate	5.43		6.19	
Poverty Rate	17.79		17.74	
Per capita Personal Income	$41,741.37		$39,697.25	
Median Household Income	$44,628.00		$47,148.09	

Source: U.S. Census Bureau; Bureau of Labor Statistics 2010-2016

The primary specification is robust to including county controls. In the figure below, we include the estimates from Figure 5 and superimpose estimates that include the variables in Table A1 as county controls. The original estimates are in solid blue and the estimates including county controls are represented by dashed lines. The estimates maintain the same trend but do become less precise. While not shown, this holds true when the treatment is defined at 50 miles and at 100 miles.

Appendix Figure 4: Poisson event study with and without control variables

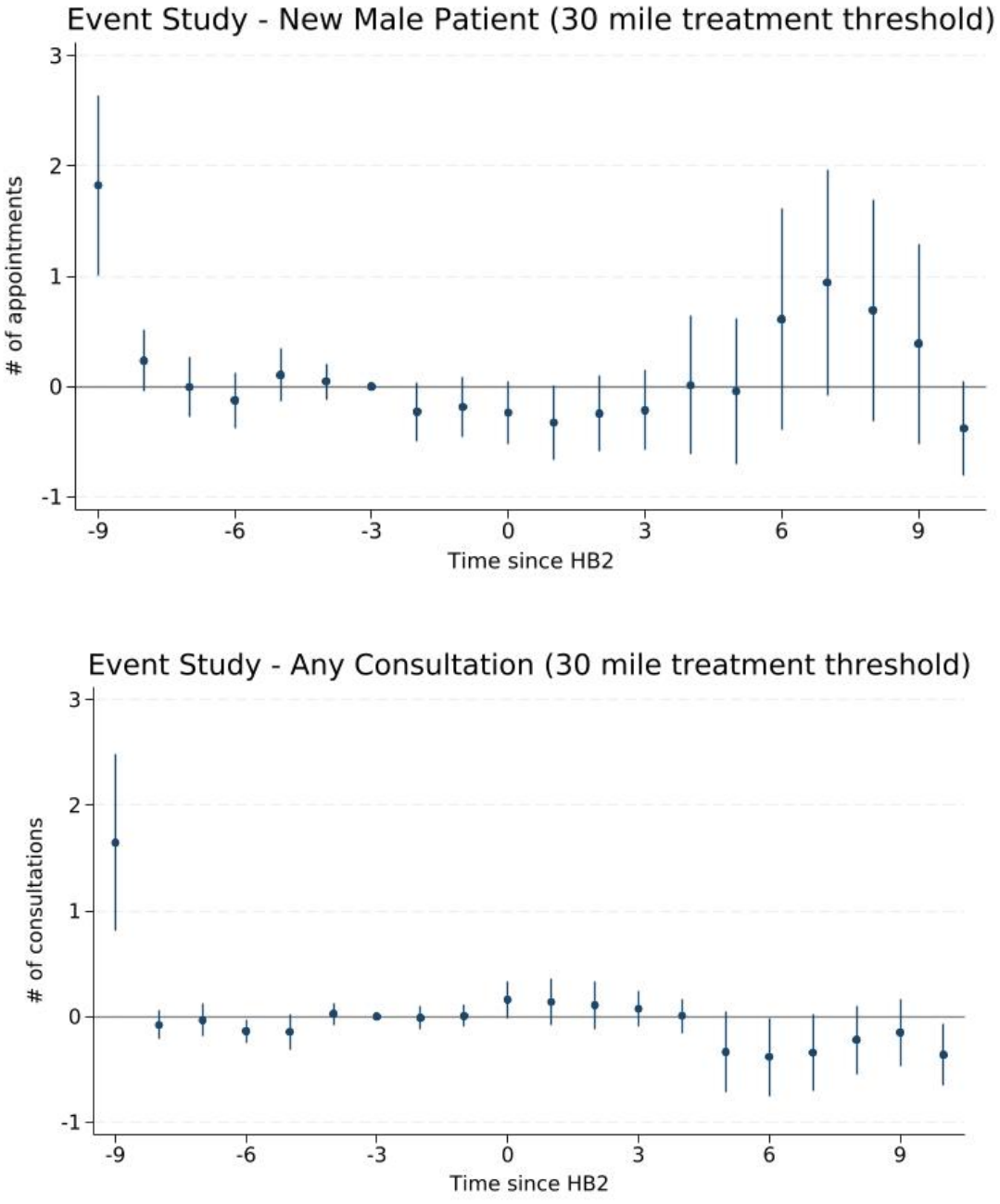


Notes: The event studies plot both the estimates plotted in Figure 5 (solid line), which do not include control variables, and estimates that include a set of controls (dashed line).

A.4 Vasectomy

While we do not observe a shift in vasectomy procedures following HB2, there may be increased interest in the procedure. We test whether this is the case using two methods. First, we look at the change in new patient consultations. Vasectomy procedures usually begin with a consultation, where patients meet with a physician to discuss the risks and benefits of the procedure. It is possible that individuals consider getting a vasectomy in response to abortion restrictions but change their mind after the consultation. Though our data does not specifically identify patient visits where a vasectomy is discussed, we look broadly at male patients with any new patient visit and specifically at male patients with a visit coded as an encounter for either contraceptive management (ICD-9 V25 or ICD-10 Z30) or procreative management (ICD-9 V26 or ICD-10 Z31) but not for a vasectomy (V25.2 or Z30.2). We estimate the change visits in response to HB2 using Equation 1 with the count of new patient visits or reproductive consultations as the dependent variables and present the results in Figure A5. The number of new patient visits and the number of reproductive consultations does not show any statistically significant differences before and after the introduction of HB2. We take this as evidence that male patients are not seeking out office visits to discuss having a vasectomy.

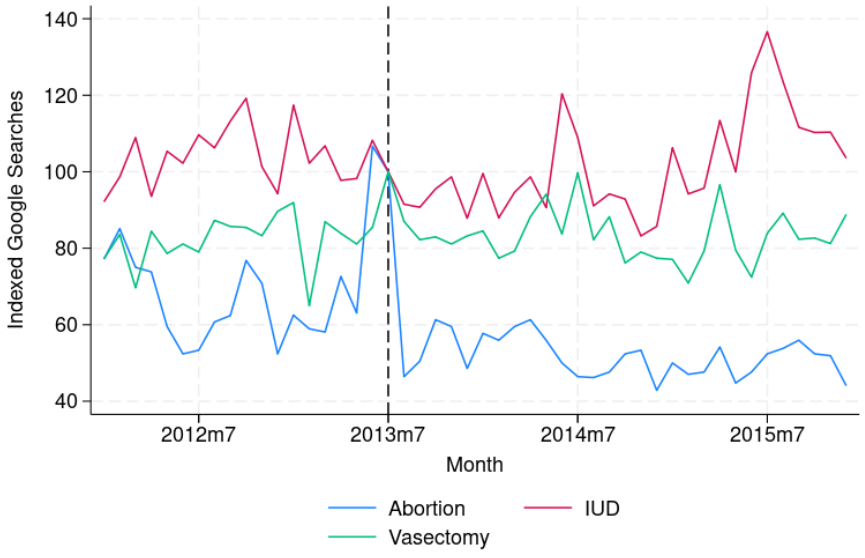
Appendix Figure 5: Poisson event study; new patient visits



Notes: This figure uses Equation 1 to estimate the change in new patient visits (top) and reproductive consults (bottom) for male patients. The estimates show the change in appointments relative to the control counties after HB2, represented by zero.

The second way that we measure interest is through Google search trends. We find Google trends for the key terms' 'vasectomy' 'IUD' and 'abortion' in Texas from January 1st, 2012, through December 31st, 2015. The trends are measured relative to the week that the search was most popular. We collapse the search history to the monthly level and index the search intensity to July 2013, which gives the relative search intensity compared to the month that HB2 was passed. Values above 100 and below 100 indicate that the popularity of the searched term was higher or lower, respectively, than the popularity in July 2013. The trends are shown in the following figure. Google searches for vasectomies peaked in July of 2013 and remained relatively stable. Searches for abortions peaked in June of 2013 and remained high for July but decreased by roughly 40 points afterwards. Last, searches for IUDs peaked in July of 2015, with July of 2013 not exhibiting different search intensity than the surrounding months.

Appendix Figure 6: Google searches relative to July 2013



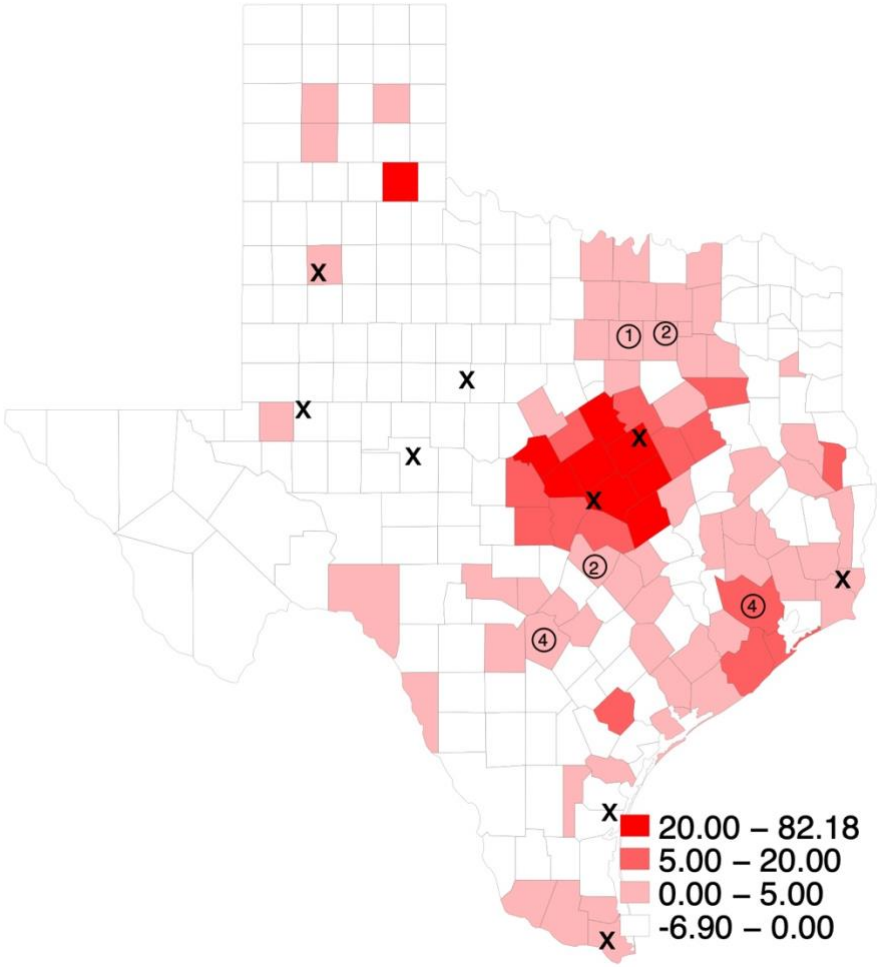
Notes: In the figure above, we plot the Google trends for the vasectomy (green), abortion (blue), and IUD (pink) relative to trends in July 2013. Values above 100 indicate that searches were higher than July 2013, while values below 100 indicate that searches were lower than July 2013.

A.5 Congestion Effects

Lindo et al. (2020) finds that HB2 not only impacted abortion access by increasing the distance to an abortion provider, but also led to increased congestion at the remaining clinics. The authors find that the effects of congestion on abortion access are larger than the effects of increased distance to a provider. Therefore, individuals in our control group who did not experience a change in distance to a provider may also face restricted access to abortion through congestion. If this is the case, our results would underestimate the effect of HB2 on LARC take-up.

To determine the severity of congestion effects, Figure A7 is a heat map similar to Figure 6, but includes all counties, not just counties in the treatment group. The X's on Figure A7 are counties that lose all abortion providers, while the circles represent counties that lose some but not all providers. The number in the center of the circle indicates the number of clinics that closed following HB2.

Appendix Figure 7: Changes in the rate of IUS insertion, 2011-2013 (all counties)



Notes: The heat map above shows the 2011 to 2013 change in the rate of LARC insertion per 10,000 resident females in all counties. X's represent areas that lost all clinics, and circles represent areas that lost access to some, but not all, clinics. The number inside the circle indicates the number of clinic closures. Clinic closures are identified by Ura et al. (2016).

Figure A7 suggests that residents of metro areas that lost some, but not all, abortion providers moderately increase their use of LARC. These individuals do not experience changes in travel distance since not all providers closed. For example, there are small increases in the

incidence of LARC in Dallas-Fort Worth, Austin, and San Antonio, and a slightly larger increases in LARC incidence in Houston. Ultimately, however, the largest changes in LARC take-up occur in counties immediately surrounding the total closure of abortion facilities, such as Waco and Killeen. Therefore, while some congestion effects may be present, they do not appear to be as large as the effects of increasing the travel distance to an abortion provider. In addition, the presence of any congestion effects in the urban areas would attenuate our primary specification estimates of the effect of restricted abortion access on contraceptive behavior. So, we conclude that our estimates are potentially conservative estimates of the true effects.